

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

SECURITIES AND EXCHANGE
COMMISSION,

Plaintiff

v

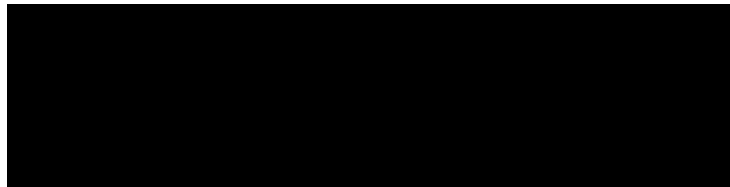
20 Civ. 10832

RIPPLE LABS, INC., BRADLEY
GARLINGHOUSE, AND
CHRISTIAN A. LARSEN,

Defendants

AMENDED EXPERT REPORT OF

 , Ph.D.



OCTOBER 6, 2021

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I. Qualifications

1. My name is [REDACTED] and I am a [REDACTED]
[REDACTED]
[REDACTED].
2. I have testified as an expert witness for the Securities and Exchange Commission on event studies and market efficiency. I have worked for defendants, plaintiffs, and governmental agencies in matters involving fraud, conspiracies and manipulations, and multisided platforms. I have worked both in assessing liability issues as well as in estimating damages.
3. I received my [REDACTED], where I specialized in statistics and econometrics, finance, monetary economics, and numerical methods. I was awarded a [REDACTED] [REDACTED] by the Economics Department. I also received my [REDACTED] [REDACTED] and my [REDACTED] where I graduated summa cum laude.
4. I began working as an economic consultant in October of 2018. Prior to that, I was employed for fifteen years at [REDACTED] where I was the [REDACTED] [REDACTED] a team of nearly 100 professionals with responsibility for developing credit models and analytical methodologies for all asset classes across all lines of business. I frequently met with U.S., European, and Asian regulators and policy makers to discuss credit risk, credit ratings performance, risk modeling, and regulatory, antitrust and other policy matters.
5. Before leading the [REDACTED] I was the [REDACTED] [REDACTED] at [REDACTED] with responsibilities including Default Research, Model Development and Verification, and Technology.
6. As an economist at [REDACTED] I specialized in credit research and modelling. While there I developed numerous econometric models of corporate and consumer credit as well as credit rating transitions. I routinely assessed the impact of new information on the credit worthiness of corporates, financial institutions, sovereign entities and structured vehicles.
7. I have developed patented models of default and credit rating transitions and trademarked models of regional real estate prices. I have developed models of residential mortgage default, prepayment and loss which have been used to assess the credit risk of hundreds of billions of dollars in securitizations. I have also developed several models of corporate and consumer credit, financial risk contagion, real estate market performance measures, and pharmaceutical drug development, among others. In addition, I conducted event studies to assess the impact of credit actions and announcements on corporate and sovereign costs of capital.

8. I have authored and co-authored articles in peer reviewed journals, trade publications, and Moody's Special Comments on subjects such as credit rating performance, corporate and sovereign defaults, collusion, manipulation, and screening. I have also contributed a chapter for a book on emerging markets and sovereign risk which was based, in part, on an event study analysis.
9. My curriculum vitae is included as Appendix A. The [REDACTED] charges an hourly rate of \$600 for my time in this matter. Staff at [REDACTED] have assisted me by performing work at my direction. My opinions are my own, and neither mine nor The [REDACTED] compensation are dependent on my opinions or the outcome of this matter.

II. Assignment

10. I have been retained by the Securities and Exchange Commission ("SEC") to provide expert opinions in the matter captioned above. Specifically, I was asked to perform an empirical analysis of XRP's price movements and assess whether actions by Ripple Labs, Inc. impact XRP prices. In conjunction with this assignment, I have been asked to assess the extent to which XRP price movements are driven by price movement in Bitcoin and other digital tokens. I have also been asked to be prepared to respond as needed on an expert issue or provide a rebuttal report on any subject on which I am qualified to opine.
11. My opinions are based on my knowledge and expertise gained during my professional career and my academic training and research. In forming my opinions in this matter, I have considered certain documents provided to me. A list of the documents I have relied upon is attached as Appendix B. In addition, I have prepared work papers that are available upon request. The opinions stated in this report are based on the evidence that has been provided to me to date. I am not opining on the accuracy of how Ripple describes its products or certain events in news or other public announcements. My work in this matter is ongoing, and I reserve the right to modify or supplement my conclusions as additional information is made available to me, or as I perform further analysis.

III. Summary of Opinions

12. Based on my analysis and review of documents produced in this matter, I have reached the following opinions:
 - a. **XRP prices react to certain news and public statements about Ripple's actions.** Using a well-accepted event study methodology, I find statistically significant evidence that XRP prices react to news about Ripple's actions. This is particularly true for news of important milestones in the history of Ripple Labs and for announcements more directly related to XRP. The results hold for nearly all statistical models I examine at scientifically accepted levels of statistical significance. In no case do I

find a significant correlation of news and XRP returns in the days before the news, again confirming that XRP prices are reacting to news about Ripple’s actions. Taken together, this evidence indicates that XRP prices react to the news of actions by Ripple Labs.

In Figure 1, I present a summary table that illustrates my findings. Across 20 different regression model specifications, which in varying degrees account for the price movements of digital tokens like Bitcoin (“BTC”), Ether (“ETH”), and other variables, I indicate the cases in which the relationship between news and XRP prices is statistically significant.¹

FIGURE 1: XRP PRICES REACT TO DIFFERENT TYPES OF RIPPLE NEWS

Model Number	Milestones	Trading Platform Listings	Customers & Product Developments	Ripple Commercialization Initiatives	Select Categories
1	✓	✓	✓	✓	✓
2	✓	✓	✓		✓
3	✓	✓	✓	✓	✓
4	✓	✓	✓		✓
5	✓	✓	✓	✓	✓
6	✓	✓	✓		✓
7	✓	✓	✓	✓	✓
8	✓	✓	✓		✓
9	✓	✓	✓	✓	✓
10	✓	✓	✓		✓
11	✓	✓	✓	✓	✓
12	✓	✓	✓	✓	✓
13	✓	✓	✓	✓	✓
14	✓	✓	✓	✓	✓
15	✓	✓	✓	✓	✓
16	✓	✓	✓		✓
17	✓	✓	✓	✓	✓
18	✓	✓	✓		✓
19	✓	✓	✓	✓	✓
20	✓	✓	✓	✓	✓

Notes:

✓	Indicates significance at the 5% level.
	Indicates not significant at the 5% level.

Select Categories is defined as the combination of Corporate Milestones, Trading Platform listings, Customer & Product Announcements, Ripple Commercialization Initiatives, and Acquisitions & Investments.

¹ Throughout this report, unless otherwise noted I shall use the phrase “statistically significant” to refer to model outcomes for which the probability of occurring under the null hypothesis is 5% or less. This “5% significance level” is a common standard for academic research.

- b. **The relationship between XRP returns and the returns of other digital tokens changes over time.** In studying the degree to which XRP returns correlate with those of BTC and ETH, I find evidence that those relationships change over time. Correlations with other digital tokens are sometimes zero or even negative. Such correlation does not preclude that XRP prices could react to news and public statements about certain Ripple actions.

IV. Overview of Ripple Labs and XRP

A. Company Overview

13. Ripple Labs, Inc. (“Ripple”) is a for-profit technology company based in San Francisco, CA. According to its website, Ripple has 500 employees and nine offices around the globe.² Ripple’s senior leadership and executives include Chris Larsen, who is the Executive Chairman of Ripple’s board of directors and former Chief Executive Officer (“CEO”), Brad Garlinghouse, who currently serves as CEO, and David Schwartz, who serves as Chief Technology Officer (“CTO”).³
14. Throughout its history, Ripple has highlighted certain news or initiatives of the company. Such announcements relate to Ripple raising funds from venture capital investors in 2015, 2016 and 2019, its joint venture with SBI Holdings, and its receipt of a Bitlicense from the State of New York, Department of Financial Services.⁴ Another event in the company’s history that Ripple chose to highlight is its decision

² “Our Story,” Ripple.com, (“500 Employees, 9 Global Offices, 3X YoY Customer Growth”), accessed September 28, 2021, <https://ripple.com/company>.

³ “Leadership,” Ripple.com, accessed September 28, 2021, <https://ripple.com/company/leadership/>; see also, “Board of Directors,” Ripple.com, accessed September 28, 2021, <https://ripple.com/company/board-of-directors/>.

⁴ See, e.g., “Ripple Labs Closes \$28 Million Series A Funding Round,” Ripple, May 19, 2015, accessed September 10, 2021, https://ripple.com/ripple_press/ripple-labs-closes-28-million-series-a-funding-round/; “Ripple Raises \$55 Million in Series B Funding,” Ripple, September 15, 2016, accessed September 10, 2021, https://ripple.com/ripple_press/ripple-raises-55-million-series-b-funding/; and “Ripple Caps Record Year With \$200 Million Series C Funding,” Ripple, December 20, 2019, accessed September 10, 2021, <https://ripple.com/insights/ripple-caps-record-year-with-200-million-series-c-funding/>. “Ripple Strikes Multi-National Deal with SBI Holdings to Meet Growing Demand for Ripple Solutions Across Asia,” Ripple Press, January 28, 2016, accessed September 10, 2021, https://ripple.com/ripple_press/ripple-strikes-multi-national-deal-with-sbi-holdings-to-meet-growing-demand-for-ripple-solutions-across-asia/. See, “Ripple Receives New York’s First BitLicense for an Institutional Use Case of Digital Assets,” Ripple Insights, June 13, 2016, accessed September 10, 2021, <https://ripple.com/insights/ripple-receives-new-yorks-first-bitlicense-institutional-use-case-digital-assets/>.

to put 55 billion XRP tokens into escrow, which according to Ripple would ensure supply predictability for XRP “investors.”⁵

15. According to its website and other promotional materials distributed by the company, Ripple operates a network called RippleNet, which the company advertises as a real-time settlement system that aims to enable nearly instantaneous monetary transactions globally.⁶
16. Prior to branding RippleNet in 2019, Ripple separately marketed its commercial products under the names xRapid, xVia, and xCurrent. xRapid became commercially available in October 2018⁷ and was eventually re-branded as On-Demand Liquidity (“ODL”).⁸ xRapid or ODL allow users to transfer one currency to another with XRP facilitating the transfer.⁹ According to Ripple’s public announcements, the primary selling point of this process is that it would provide faster and less expensive settlements compared to traditional cross-currency payment processing.¹⁰

⁵ This action was announced in May 2017 and completed in December 2017. See, “Ripple to Place 55 Billion XRP in Escrow to Ensure Certainty of Total XRP Supply,” Brad Garlinghouse, *Ripple Insights*, May 16, 2017, accessed September 10, 2021, <https://ripple.com/insights/ripple-to-place-55-billion-xrp-in-escrow-to-ensure-certainty-into-total-xrp-supply/>. (“By securing the lion’s share of our XRP, investors can now mathematically verify the maximum supply of XRP that can enter the market.”); see also, “Ripple Escrows 55 Billion XRP for Supply Predictability,” *Ripple Insights*, December 7, 2017, accessed September 10, 2021, <https://ripple.com/insights/ripple-escrows-55-billion-xrp-for-supply-predictability/>.

⁶ RippleNet Brochure, Ripple.com, accessed September 28, 2021, https://ripple.com/files/ripplenet_brochure.pdf (“The needs of individuals and businesses sending cross-border payments have dramatically evolved. These customers are now demanding real-time, low-cost and fully trackable payments on a global scale. Yet, today’s global payments infrastructure yields an experience that is slow, costly and opaque. Ripple solves these pain points through RippleNet, a network of banks, payment providers and others. Employing Ripple’s solutions and a standardized ruleset allows for those connected on RippleNet to efficiently send and receive payments around the world.”).

⁷ “Ripple Highlights Record Year, xRapid Now Commercially Available,” *Ripple Press*, October 1, 2018, accessed August 22, 2021, https://ripple.com/ripple_press/ripple-highlights-record-year-xrapid-now-commercially-available/.

⁸ “Ripple’s blockchain cross-border payments network grows to 300,” *Ledger Insights*, November 7, 2019, <https://www.ledgerinsights.com/ripple-blockchain-300-customers/>, accessed October 1, 2021. (“Until recently, Ripple had two main products called xCurrent and xRapid on RippleNet. The former is a messaging system for payments which competes with SWIFT. The latter uses Ripple’s digital currency XRP for fund transfers. However, the two were merged into the RippleNet brand, with xRapid rebranded as On-Demand Liquidity (ODL) which leverages XRP.”).

⁹ “Free Working Capital with On-Demand Liquidity,” *Ripple.com*, accessed October 1, 2021, <https://ripple.com/ripplenet/on-demand-liquidity/>. (“Through the On-Demand Liquidity (ODL) service, RippleNet leverages the digital asset XRP as a bridge between two currencies, allowing you to eliminate pre-funding of destination accounts, reduce operational costs and unlock capital.”).

¹⁰ See, e.g., “goLance Leverages On-Demand Liquidity to Deliver Faster, Cheaper Payments to Their Global Marketplace of Freelancers,” *Ripple Insights*, January 29, 2020, accessed October 1, 2021, <https://ripple.com/insights/golance-leverages-on-demand-liquidity-to-deliver-faster-cheaper-payments-to-their-global-marketplace-of-freelancers/>. (“RippleNet’s On-Demand Liquidity gives us the ability to make hyper-efficient, low-cost payments that make our customers happy and drive growth for our business.”).

17. xVia is described as a software tool that provides a single API to standardize connections between different payment networks.¹¹ xVia signed its first five customers in April of 2018, before later being integrated into RippleNet.¹² xCurrent, which became available in the first quarter of 2018,¹³ is the software that eventually became the underlying platform of RippleNet. xCurrent “enables banks to message and settle their transactions... with RippleNet members.”¹⁴ The three products were integrated into RippleNet in October of 2019.¹⁵
18. In addition to its direct commercial efforts, Ripple has engaged in and publicized various other initiatives over time. Some of these initiatives are directed to commercialize its product suite and technology and perhaps ultimately to create use-cases for XRP. As an example, the Xpring program was a venture capital initiative announced in May 2018.¹⁶ The goal of Xpring was to “invest in, incubate, acquire and provide grants to companies and projects run by proven entrepreneurs” who intended to “use XRP and the XRP Ledger...to solve their customer’s problems in a transformative way.”¹⁷ Company documents indicate that by 2019, Ripple had invested \$500M in over 20 companies through Xpring.¹⁸ In 2020, Xpring was re-branded as RippleX.¹⁹
19. Ripple also engaged in and publicized initiatives directed to more general blockchain research or other company interests. An example of the latter type of initiative is the University Blockchain Research Initiative (“UBRI”). As described by Ripple, UBRI is a partnership program between Ripple and various

¹¹ See Birla Deposition Exhibit 32, WSJ D.Live Briefing Materials, October 30, 2018 [RPLI_SEC 0081034 at RPLI_SEC –81039]; see also, “xVia: A brief product overview for payment originators,” October 2017, accessed August 26, 2021, https://ripple.com/files/xvia_brochure.pdf, at p. 8.

¹² See Asheesh Birla, “xVia Opens New Doors in Emerging Markets,” Ripple Insights, April 26, 2018, accessed August 26, 2021, <https://ripple.com/insights/xvia-opens-new-doors-in-emerging-markets/>.

¹³ See David Z. Morris, “Ripple-Powered Mobile Payments to Debut at Santander,” Fortune, February 3, 2018, accessed August 26, 2021, <https://fortune.com/2018/02/03/ripple-mobile-payments-santander/> (“The xCurrent-based service, referred to simply as “Pay” in a recent Santander earnings presentation, is projected to go live in the U.K., Spain, Brazil, and Poland in the first quarter of this year.”).

¹⁴ “xCurrent: A brief technical overview for financial institutions on RippleNet,” October 2017, accessed August 20, 2021, https://ripple.com/files/xcurrent_brochure.pdf, p. 4.

¹⁵ Sead Fadilasic, “This is Why Ripple Removed xRapid, xVia, and xCurrent from their Site,” Cryptonews, October 9, 2019, accessed August 26, 2021, <https://cryptonews.com/news/this-is-why-ripple-removed-xrapid-xvia-and-xcurrent-from-the-4817.htm>.

¹⁶ “Welcome to Xpring,” Ripple Insights, May 14, 2018, accessed August 20, 2021, <https://ripple.com/insights/welcome-to-xpring/>.

¹⁷ “Welcome to Xpring,” Ripple Insights, May 14, 2018, accessed August 20, 2021, <https://ripple.com/insights/welcome-to-xpring/>.

¹⁸ See Madigan Deposition pp. 198:23 – 205:5; see also, Madigan Deposition Exhibit 15, Email from Breanne Madigan to D. Samarasinghe, July 15, 2019, [RPLI_SEC0200768] and Madigan Deposition Exhibit 56, Q2 2019 XRP Markets Report, July 24, 2019.

¹⁹ Madigan Deposition, p. 60:5-13 (“Q... Is – is Xpring something that still exists or that no longer exists? A. So after Ron will and Ethan left around the same time, both the former Xpring team and the markets team were moved under Monica Long in a newly formed group called RippleX.”).

universities to "support academic research, technical development and innovation in blockchain, cryptocurrency and, [sic] digital payments."²⁰ According to its webpage, Ripple has committed \$50 million to its UBRI initiative.²¹

20. To date, Ripple's primary source of funding has been sales of XRP tokens, according to company financial statements. As shown in Figure 2, almost all of Ripple's revenue for the years 2013 to 2020 derived from XRP sales. According to figures disseminated by Ripple, it sold approximately \$1.4 billion worth of XRP between Q1 2017 and Q4 2020 to a mix of institutional investors and retail investors via digital asset trading platforms and over-the-counter ("OTC") sales.²² In addition to funding through XRP sales, Ripple also raised approximately \$300 million in funding from angel investors and venture capital firms in Series A, Series B, and Series C rounds.²³

FIGURE 2: RIPPLE LABS REVENUE BY SOURCE, 2013-2020 (\$ IN MILLIONS)

	2013	2014	2015	2016	2017	2018	2019	2020
XRP Token Revenue	\$4.4	\$13.4	\$12.2	\$15.6	\$186.1	\$552.1	\$710.8	\$457.8
XRP Token Revenue (% of Total)	100.0%	99.5%	96.0%	89.6%	97.5%	99.0%	98.9%	99.7%

Note: For the years 2019 and 2020, Ripple Labs lists revenues from "XRP transactions" and "Non-monetary XRP transactions" separately. This table includes the sum of both as "XRP Token Revenue."

Source: Ripple Labs Financial Statements, 2013-2020 (RPLI_SEC 0090938; RPLI_SEC 0426161; NY-9875_T_00017816; RPLI_SEC 0267872; RPLI_SEC 0920429).

²⁰ "What is University Blockchain Research Initiative (UBRI)?" accessed August 24, 2021, <https://ubri.ripple.com/faq/>.

²¹ "What is University Blockchain Research Initiative (UBRI)?" accessed August 24, 2021, <https://ubri.ripple.com/faq/>.

²² "XRP Markets Reports," Ripple, 1Q2017 – 2Q2020, <https://ripple.com/insights>. See also, Figure 6.

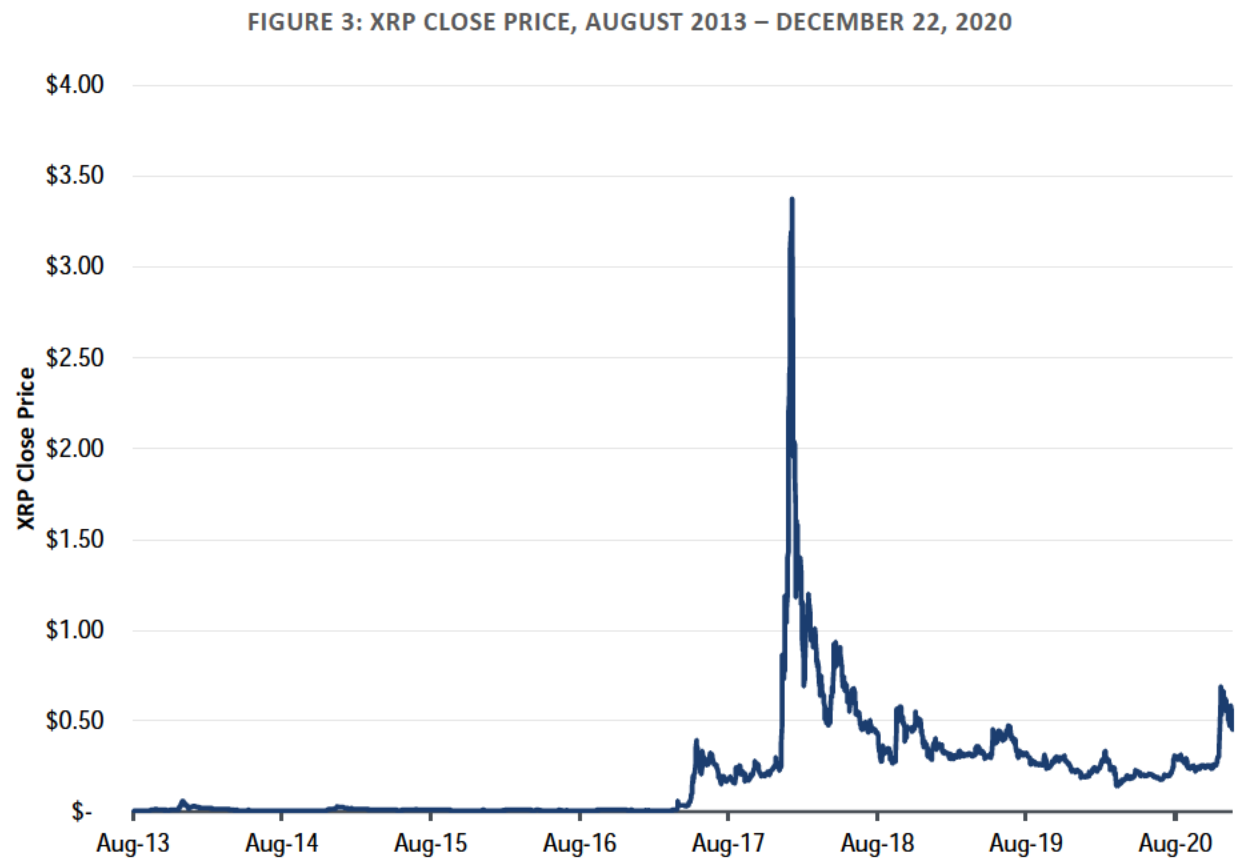
²³ "Ripple Labs Closes \$28 Million Series A Funding Round," Ripple, May 19, 2015, accessed September 10, 2021, https://ripple.com/ripple_press/ripple-labs-closes-28-million-series-a-funding-round/; "Ripple Raises \$55 Million in Series B Funding," Ripple, September 15, 2016, accessed September 10, 2021, available at https://ripple.com/ripple_press/ripple-raises-55-million-series-b-funding/; "Ripple Caps Record Year With \$200 Million Series C Funding," Ripple, December 20, 2019, accessed September 10, 2021, available at <https://ripple.com/insights/ripple-caps-record-year-with-200-million-series-c-funding/>.

B. XRP Trades on Digital Asset Trading Platforms

21. Digital asset trading platforms are marketplaces where those who wish to buy and sell digital tokens such as XRP can connect. Trading is conducted 24 hours a day, seven days a week on digital asset trading platforms, so there is no “opening” and “closing” of daily trading like in traditional financial exchanges.²⁴ Some of the largest and best-known U.S. trading platforms include Coinbase, Kraken, and Gemini, though there are hundreds of trading platforms globally.
22. As with other digital tokens, XRP trades are in the form of asset pairs in which one specified token is exchanged for another specified token or for a fiat currency. For example, XRP-BTC represents the XRP to Bitcoin (“BTC”) pair (i.e., XRP prices denominated in BTC) and XRP-USD represents the XRP to U.S. Dollar pair (i.e., XRP prices denominated in USD).
23. As shown in Figure 3 and Figure 4, XRP prices fluctuated substantially over time. For the first several years, it traded at or below one cent per XRP token for the most part. From mid-2017 to December 2020, XRP prices have ranged from approximately \$0.25 per token to a high of about \$3.40.²⁵

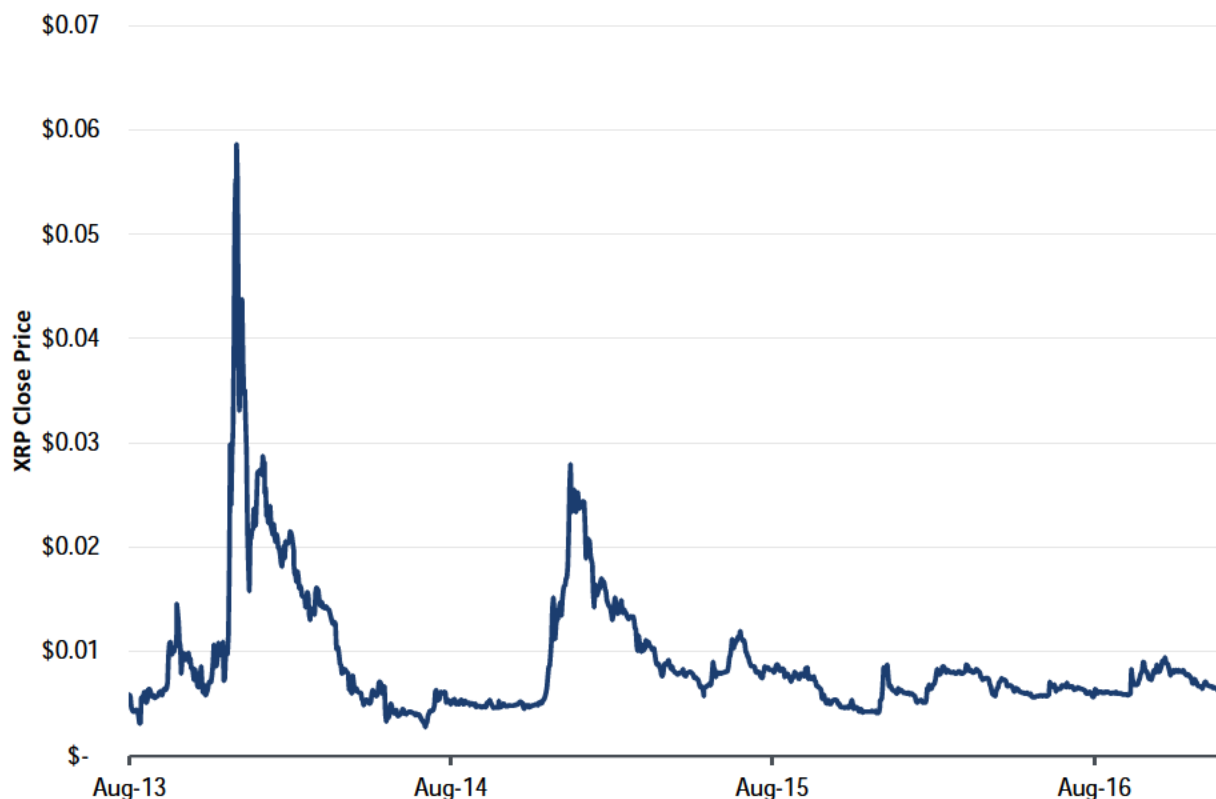
²⁴ Ash Bennington, “Crypto Assets Trade 24/7 – And that Changes More than Uptime,” Coindesk.com, July 24, 2017, accessed September 28, 2021, <https://www.coindesk.com/markets/2017/07/24/crypto-assets-trade-247-and-that-changes-more-than-uptime/> (“Let’s start with one of the most obvious aspects of cryptocurrency: Markets trade 24 hours a day, seven days a week – and that feature, as I’ll explain, changes a lot more than market uptime...For one, the 24-hour market structure requires investors to think about the daily price changes in their positions through a different conceptual lens than their stock portfolios. In the U.S., stocks listed on The New York Stock Exchange or the NASDAQ Stock Market trade, during regular market hours, between 9:30 a.m. and 4 p.m. EST.”).

²⁵ The pricing data in Figure 3 is taken from CoinMarketCap.com, which provides a volume-weighted price across a number of digital asset trading platforms. The website hosts historical daily price data for XRP, including “open” and “close” prices based on the earliest and latest trade data in the UTC time zone, as well as a high price and a low price for the day.



Source: CoinMarketCap.

FIGURE 4: XRP CLOSE PRICE, AUGUST 2013 – DECEMBER 31, 2016



Source: CoinMarketCap.

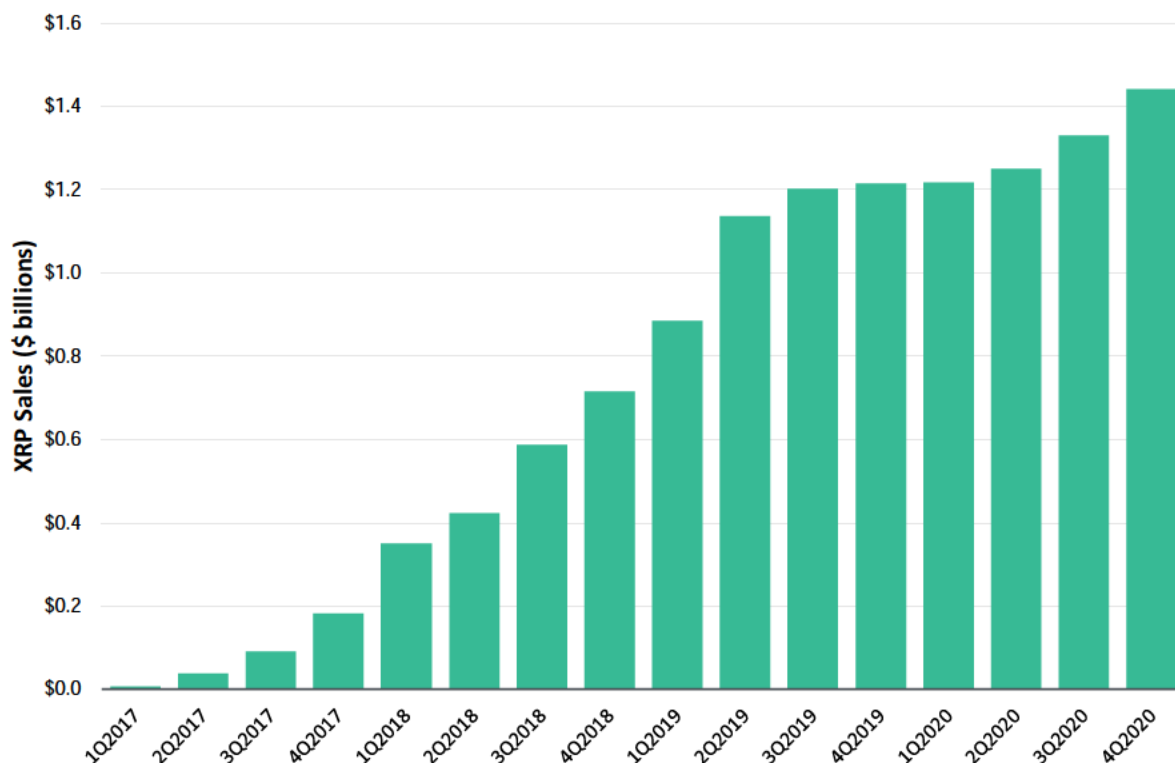
C. Ripple Sold XRP through Various Channels to Fund Operations

24. Ripple has sold more than \$1.4 billion dollars worth of XRP tokens through various channels. As Mr. Garlinghouse explained in a February 2020 *Financial Times* article, Ripple was dependent on XRP sales for its operating cash needs, saying that "We would not be profitable or cash flow positive [without selling XRP], I think I've said that."²⁶

²⁶ Izabella Kaminska and Cat Rutter-Pooley, "The art of redefining success, MoneyGram and Ripple edition," *Financial Times*, February 28, 2020. ("When pressed on Ripple's own profitability, Mr. Garlinghouse noted that Ripple, the company, was cash flow positive. How much of that cash flow was coming from service provision as opposed to sales of pre-existing XRP stock was less clear. Asked if XRP was keeping everything cash flow positive at Ripple Labs, Mr. Garlinghouse answered: 'Well XRP is one source. I don't know how to answer that because if you took away our software revenues, that would make us less profitable. If you took away all our XRP, that makes us less profitable. So I don't think about it as one thing.' He clarified later: 'We would not be profitable or cash flow positive [without selling XRP], I think I've said that. We have now.'").

25. As show in Figure 5, Ripple reported that it raised approximately \$1.4 billion from sales of XRP through the fourth quarter of 2020.

FIGURE 5: CUMULATIVE QUARTERLY SALES OF XRP BY RIPPLE



Sources: Ripple sales from Quarterly XRP Markets Reports, 1Q2017 - 4Q2020.

26. Ripple classified its sales of XRP into two categories: programmatic sales and OTC sales.
- The programmatic sales were sales of XRP on digital asset trading platforms, managed by third-party market making firms, with two major ones being GSR and Cryptosystems.²⁷

²⁷ Madigan Deposition, p. 51:4-23 ("Q.... When you arrived at Ripple, when you arrived at Ripple, to the extent you knew about programmatic sales, who was buying XRP from Ripple in programmatic sales? A. Sure. So the one point of clarification I wanted to make is that Ripple does not have a trading desk and so Ripple relies on third parties for its programmatic sales; namely, market makers. And, in particular, my recollection is that GSR and Cryptosystems were both managing those sales of XRP. Q. GSR and Cryptosystems were serving as intermediaries between Ripple and the market, is that correct? A. I think that's a fair term, although I don't know what -- yeah, what you'd call them, but they managed the sales of the XRP because Ripple couldn't sell directly.").

- b. The OTC sales were negotiated block sales of XRP to large purchasers.²⁸ The OTC buyers included wealthy individuals, hedge funds, other investment firms, and financial institutions that had contracted with Ripple to transact in XRP using ODL.²⁹
27. As show in Figure 6, Ripple reported \$745 million of XRP sales in the form of programmatic sales on digital asset trading platforms followed and another \$698 million in OTC sales from the first quarter of 2017 through the end of 2020.

²⁸ Griffin Deposition, pp. 149:6 – 150:18 (“Q. Mr. Griffin, in connection with your employment at Ripple, does the term “OTC sales” mean anything to you? A. Yes. Q. What does it mean? A. An OTC sale is over-the-counter sale. Q. Sale of what? A. XRP. Q. And why -- what’s the reference to over the counter?... A. I think the -- the idea of an O -- what we -- I would have thought about an OTC as a sale to a large purchaser of XRP. Q. And were you -- what was -- what, if any, was your involvement with OTC sales of XRP while you were employed at Ripple? A. I managed the team that was charged with that responsibility. ... Q. And was one of their responsibilities to negotiate the potential purchases of XRP?... A. Yes.”).

²⁹ Griffin Deposition, pp. 163:2 – 164:3. (“Q. ...You know, what are the categories of persons that bought XRP from Ripple as OTC purchasers while you were at Ripple?... A. What -- there were individuals and investment firms. So, like, financial institutions. Brokers. I recall vaguely there was also mar -- possibly market makers. I can’t remember exactly the composition of who was buying it, but that sounds -- sounds right. Q. To the extent there were individuals, were -- you know, were these wealthy individuals or sort of -- what -- can you give me a little more about the types of individuals?... A. For the most part, that sounds right, that they were wealthy individuals if they were individuals. Q. And does investment firms include, like, hedge funds and things of that nature? A. Right.”).

FIGURE 6: RIPPLE QUARTERLY XRP SALES BY CHANNEL
(\$ MILLIONS)

	Programmatic Sales	OTC Sales	All Sales
	[1]	[2]	[3] = [1] + [2]
1Q2017	-	\$6.70	\$6.70
2Q2017	\$10.30	\$21.00	\$31.30
3Q2017	\$32.60	\$19.60	\$52.20
4Q2017	\$71.50	\$20.10	\$91.60
1Q2018	\$151.10	\$16.60	\$167.70
2Q2018	\$56.66	\$16.87	\$73.53
3Q2018	\$65.27	\$98.06	\$163.33
4Q2018	\$88.88	\$40.15	\$129.03
1Q2019	\$107.49	\$61.93	\$169.42
2Q2019	\$144.64	\$106.87	\$251.51
3Q2019	\$16.12	\$50.12	\$66.24
4Q2019	-	\$13.08	\$13.08
1Q2020	-	\$1.75	\$1.75
2Q2020	-	\$32.55	\$32.55
3Q2020	-	\$81.39	\$81.39
4Q2020	-	\$111.12	\$111.12
Total	\$744.56	\$697.89	\$1,442.45

Sources: XRP Markets Reports, 1Q2017 - 4Q2020.

V. Analytical Methodology

28. In this section, I describe the methodology I use to test whether XRP returns are associated with news about Ripple. My analysis builds upon a well-accepted econometric framework referred to as an event study. An event study is commonly used to measure the impact of new public information on market

prices.³⁰ Event studies have been widely used in the academic literature for over 40 years,³¹ and have also been commonly accepted in the context of securities financial litigation.³²

29. Event studies on the price of a security generally proceed with the understanding that the price is expected to be affected by important, unanticipated news about the company. For example, if an event study shows that the stock price for Company X does not change following a particular earnings announcement from Company X, this would generally be taken as evidence that the earnings announcement was not “important” (or that it was not “news”). It is generally *not* taken as evidence that the stock price of Company X is independent of the earnings of Company X.
30. In the matter at hand, I understand that the XRP token is not a claim on the assets or earnings of Ripple Labs and that Ripple Labs maintains that market participants do not view Ripple Labs’ efforts as relevant to the XRP market price. I have been asked by the SEC’s litigation counsel to test whether news about Ripple Labs and its actions is associated with statistically significant XRP price changes. This association can be tested based on the idea of independence – that is, by evaluating the likelihood that news about Ripple Labs would occur at the same time as a significant XRP price change.³³
31. Even if XRP prices are independent of Ripple Labs, there will likely be, by sheer coincidence, examples of “news” happening at the same time as “significant price changes.” Similarly, even if Ripple Labs does affect XRP prices, there will likely be examples of “news” without “significant price changes,” and vice versa. To analyze the independence between XRP prices and news about Ripple Labs, I therefore examine the question: Do the instances of “news” coincide with “significant price changes” more frequently than random chance could explain?
32. As a second analysis, I consider the news jointly and test whether, as a group, XRP price increases on news days are significantly large. This analysis, known as the generalized rank test, is also used in the

³⁰ A. Craig MacKinlay, “Event Studies in Economics and Finance,” *Journal of Economic Literature* Vol. 35, 1997, pp. 13-39 at p. 13.

³¹ John J. Binder, “The Event Study Methodology Since 1969,” *Review of Quantitative Finance and Accounting* Vol. 11, 1998, pp. 111-137 at p. 111.

³² See, Frank Torchio, “Proper Event Study Analysis in Securities Litigation,” *The Journal of Corporation Law*, Vol. 35, 2009, pp. 159-168, at p. 159 (“For over two decades, event studies have been prominently used as a valuation technique in various litigation matters including securities litigation.”).

³³ Two events are independent if the occurrence of one event does not affect the occurrence of the other. See, e.g., Morris H. DeGroot and Mark J. Schervish, “Probability and Statistics”, 4th Edition, p. 66 (“The conditional probability of the event A given that the event B has occurred is the revised probability of A after we learn that B has occurred. It might be the case, however, that no revision is necessary to the probability of A even after we learn that B occurs. ... In this case, we say that A and B are independent events.”).

academic literature on how digital token prices (including XRP) respond to news events.³⁴ It tests whether the price returns associated with a collection of events is statistically significant.³⁵

33. In this section, I describe my methodology for testing the above question. I begin with a brief primer on event studies in the context of digital tokens, describe the regression models I consider, describe my approach to assembling news, and then explain how I use these elements to statistically evaluate the relationship between Ripple Labs and XRP prices.

A. Event Studies in the Context of Digital Tokens

34. Event studies have been used for decades in academic research to examine market price reactions to the publication of new information.³⁶ An event study is conducted by first specifying a model of *expected* price movements and then testing the extent to which *actual* price movements differ from those expectations. The econometric question an event study answers is whether the differences between actual and expected price movements are sufficiently large that, from a statistical standpoint, such differences are unlikely to be explained by random chance. “Sufficiently large” differences between the actual price movement and the expected price movement are those which are “statistically significant.” I provide a detailed discussion of the event study methodology in Appendix D.
35. Securities markets in which prices adjust to new information “quickly” are called informationally efficient.³⁷ Academic researchers have found that the digital token markets, including the XRP market, are generally less informationally efficient than the stock market, though there is evidence that efficiency is increasing over time.³⁸ My own analysis—discussed in detail in Appendix F—is consistent
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³⁴ Mohammad Hashemi Joo, Yuka Nishikawa, and Krishnan Dandapani, “Announcement effects in the cryptocurrency market,” *Applied Economics* Vol. 52, No. 44, 2020, pp. 4794-4808 at p. 4800.

³⁵ This generalized rank testing procedure is developed by James W. Kolari and Seppo Pynnonen. See, James W. Kolari and Seppo Pynnonen, “Nonparametric Rank Tests for Event Studies,” *Journal of Empirical Finance* Vol. 18, 2011, pp. 953-971.

³⁶ A. Craig MacKinlay, “Event Studies in Economics and Finance,” *Journal of Economic Literature*, Vol. 35, 1997, pp. 13-39. See also, Abigail McWilliams and Donald Siegel, “Event studies in management research: Theoretical and empirical issues,” *Academy of Management Journal*, Vol. 40, No. 3, 1997, pp. 626-657.

³⁷ Eugene F. Fama, “Efficient Capital Markets: A Review of Theory and Empirical Work,” *The Journal of Finance* Vol. 25 (2), 1970, pp. 383-417.

³⁸ See, e.g., Andrew Urquhart, “The Inefficiency of Bitcoin,” *Economics Letters* Vol. 148, 2016, p. 5 (“...we do show that Bitcoin may becoming more efficient with some of the tests for market efficiency suggesting that Bitcoin returns are random in the second subsample. ... Since it is a relatively new investment asset and still in its infancy, it is similar to an emerging market and therefore the inefficiency finding is not surprising. Consistent with this argument is that Bitcoin will become more efficient over time as more investors analyse and trade Bitcoin.”); Aurelio F. Bariviera, “The Inefficiency of Bitcoin Revisited: A Dynamic Approach,” *Economics Letters* Vol. 161, 2017, Abstract (“...daily returns exhibit persistent behavior in the first half of the period under study, whereas its behavior is more informational efficient since 2014.”); Aviral Kumar Tiwari, R.K. Jana, Debojyoti Das, and David Roubaud, “Informational Efficiency of Bitcoin—An Extension,” *Economics Letters* Vol. 163,

with the academic literature in that, by one common measure of efficiency (serial correlation), the XRP market is not fully efficient during the period of interest.³⁹

36. Academic researchers have applied the event study methodology to digital token markets.⁴⁰ For example, Joo, Nishikawa, and Dandapani (2020) used an event study to evaluate the price reaction of BTC, ETH, and XRP to major news events and found all three digital tokens have statistically significant abnormal returns in connection with the identified news events.⁴¹
37. When conducting event studies on digital token prices, academic researchers typically investigate price reactions over multi-day windows.⁴² This accounts for the possibility that digital token prices may not react to relevant information as “quickly” as would be observed in some other markets.
38. In my analysis below, I adapt several aspects of the Joo, Nishikawa, and Dandapani (2020) and Gerritsen, Lugtigheid, and Walther (2021) methodologies to the matter at hand. Where they allow up to seven days for prices to react to news, I conservatively limit my analysis to a three day window – meaning, I associate price reactions to a news event on date t only if I find evidence of statistically significant price

2018, Abstract (“We report that the market is informational efficient as consistent to recent findings of Urquhart (2016), Nadarajah and Chu (2017) and Bariviera (2017).”); and pp. 6-7 (“We observe that the market is largely efficient with some exception to the period of April-August, 2013 and August-November, 2016.”); and Ahmet Sensoy, “The Inefficiency of Bitcoin Revisited: A High-Frequency Analysis with Alternative Currencies,” *Finance Research Letters* Vol. 28, 2019, Abstract (“We find that BTCUSD and BTCEUR markets have become more informationally efficient at the intraday level since the beginning of 2016, and BTCUSD market is slightly more efficient than BTCEUR market in the sample period.”).

³⁹ “Serial correlation” refers to the correlation of a data series with its own history, meaning that the data at time t is correlated with the data at time $t - s$ for some lag s . Because it is the correlation of a data series with its own history, “serial correlation” is also referred to as “autocorrelation.”

⁴⁰ As an early example, see Wenjun Feng, Yiming Wang, and Zhengjun Zhang, “Informed Trading in the Bitcoin Market,” *Finance Research Letters* Vol. 26, 2018, pp. 63-70, which finds evidence of informed trading in the Bitcoin market. *See also*, Dirk F. Gerritsen, Rick A.C. Lugtigheid, and Thomas Walther, “Can Bitcoin Investors Profit from Predictions by Crypto Experts?” *Finance Research Letters*, 2021 which analyzes how Bitcoin prices react to analyst commentary.

⁴¹ Mohammad Hashemi Joo, Yuka Nishikawa, and Krishnan Dandapani, “Announcement effects in the cryptocurrency market,” *Applied Economics* Vol. 52, No. 44, 2020, Abstract (“Abnormal returns as well as cumulative abnormal returns (CARs) around major news announcements, both positive and negative, are investigated for three primary cryptocurrencies: Bitcoin, Ethereum, and Ripple. High abnormal returns are observed on the event day (Day 0), and CARs typically diverge during event windows of $(-3, 6)$ and $(0, 6)$, indicating that the information is not fully reflected in prices immediately after the news events. The CARs that linger for six days after an event suggest that the information flow in the cryptocurrency market is visibly slow. The magnitudes of CARs are larger for negative events than for positive events, implying that the market reaction to negative events is stronger than to positive announcements. The findings of this study may have crucial implications for investors, arbitrageurs and practitioners as we document evidence of potential trading opportunities for investors who initiate a trading position even after announcements.”).

⁴² For example, the Joo, Nishikawa, and Dandapani (2020) paper investigates price reactions from 3 days before to 6 days after an event. The Gerritsen, Lugtigheid, and Walther (2021) paper investigates price reactions from 4 days before to 4 days after an event. *See also*, Mark Schaub, “On the OCC Announcement Allowing US Banks to Use Stablecoins and the Immediate Impact on Cryptocurrency Valuations,” *The Economics and Finance Letters* Vol. 8, 2021, Abstract (“... Bitcoin and Ethereum increased over 20% in value within 5 days of the announcement...”.) and p. 156 (“Returns are reported beginning 10 days before the OCC announcement until 10 days after for a window of $(-10, +10)$.”).

movements in the first three days.⁴³ Also, I limit my analysis to price reactions beginning on the day of the announcement and do not consider that prices may have begun reacting (perhaps based on leaks or rumors) in the days preceding the announcement. To the extent there was any leak of information, my approach is conservative.

B. Modeling XRP Returns

39. In my event study analysis, I consider several regression models of XRP price movements. The first model I consider has no control variables and is known as the Constant Mean Return Model.⁴⁴ This model has been used in other digital token event studies.⁴⁵ I then add in sequence the returns of Bitcoin (BTC), Ether (ETH), and Lumens (XLM).⁴⁶ Finally, I replace the individual return series with an equal-weighted index of these three returns as well as the returns on Binance Coin (BNB) and Ada (ADA).⁴⁷

⁴³ By adopting this standard, I am not taking the position that price reactions in the XRP token market are necessarily complete in three days. To the extent that prices continue to react for several days after a news event, my approach is conservative in that I will not include such reactions when determining the significance of an event. My results are robust to considering shorter and longer event windows. See Appendix E for results over a one day event window and a seven day event windows.

⁴⁴ See, e.g., Stephen J. Brown and Jerold B. Warner, "Using Daily Stock Returns: The Case of Event Studies," *Journal of Financial Economics* Vol. 14, 1985, pp. 3-31 (discussing estimating excess returns by subtracting mean return from actual returns at pp. 6-7).

⁴⁵ See, e.g., Mohammad Hashemi Joo, Yuka Nishikawa and Krishnan Dandapani, "Announcement Effects in the Cryptocurrency Market," *Applied Economics* Vol. 52, No. 44, 2020, pp. 4794-4808, at p. 4795 ("...we apply the mean-adjusted returns model. In this model, the mean return of the previous trading days is employed as the baseline-expected return, and abnormal returns are calculated as the difference between the actual daily return and the expected return."). See also, Dirk F. Gerritsen, Rick A.C. Lugtigheid, and Thomas Walther, "Can Bitcoin Investors Profit from Predictions by Crypto Experts?" *Finance Research Letters*, 2021.

⁴⁶ Stellar, founded in 2014 by Jed McCaleb, one of the co-founders of Ripple, shares similarities with Ripple in their blockchain technologies. The native token of the Stellar blockchain is called Lumens (XLM). See, e.g., Mary Ann Callahan, "Ripple vs. Stellar: Will There Be Only One Winner?" *FX Empire*, Yahoo News, August 29, 2018, accessed September 29, 2021, <https://www.yahoo.com/news/ripple-vs-stellar-only-one-083151892.html> ("Cryptocurrency enthusiasts frequently compare Stellar and Ripple due to the similarities in their blockchains. ... One of the co-founders of Ripple, Jed McCaleb, created Stellar in 2014. As with Ripple and XRP, Stellar refers to the technology, while XLM or Lumens refers to the cryptocurrency. Stellar is like Ripple in that it also allows for quick and affordable sending and receiving of funds. It also has similar coding to Ripple, which should be unsurprising considering their shared founder."). My pricing data for Bitcoin begins on April 28, 2013, for Lumens on August 5, 2014, and for Ether on August 7, 2015. As a result, the models which control for these tokens explicitly are not available in the very early periods of news.

⁴⁷ I construct the "equal-weighted index" using data as they become available. In the very early period, the index only comprises Bitcoin for example. My pricing data for Binance Coin and Ada begin relatively late, on July 25, 2017 and October 1, 2017, respectively, hence I do not consider models which explicitly control for those tokens.

40. For each of the five regression models above, I further control for the growth in XRP accounts.⁴⁸ This factor has been suggested in recent academic literature to be related to prices of digital tokens.⁴⁹ This gives me a total of ten sets of control variables.
41. As I discuss in more detail in Appendix F, over much of the time period in question, the XRP return on date t is correlated with the return on date $t - 1$, sometimes positively, sometimes negatively. This is known as “first order autocorrelation.” For each of the ten specifications, I therefore also estimate models that control for first order autocorrelation in XRP’s residual returns.⁵⁰
42. My analysis thus consists of 20 different models for XRP returns, which I summarize in Figure 7. I estimate all models using data from the prior 180 trading days (roughly six months) up to four days prior to the date of interest.^{51, 52}
43. The Constant Mean Return Model evaluates the XRP return in the context of its own recent history; essentially, the model flags a return as “significant” because it is significantly different from the returns of the previous 180 days.⁵³ By controlling for the returns of other digital tokens, as many of the other

⁴⁸ XRP Scan reports counts of unique account addresses on the XRP Ledger created each day. These addresses are base58-formatted identifiers derived from the associated public key. My data on account creation begins on January 2, 2013 when 3 new accounts are reported. I do not have data on the number of accounts that may have existed before that day and assume it was 0. See “Integration Guide: Account,” XRPScan, accessed October 2, 2021, <https://docs.xrpscan.com/integration-guide.html>.

⁴⁹ Yukun Liu and Aleh Tsyvinski, “Risks and Returns of Cryptocurrency,” *The Review of Financial Studies* Vol. 34, 2021, pp. 2699-2700 (“We use four measures to proxy for the network effect: the number of wallet users, the number of active addresses, the number of transaction count, and the number of payment count. ... these results suggest that the network factors that measure the network effect of user adoptions are important drivers of cryptocurrency prices.”).

⁵⁰ To correct for this autocorrelation, I follow standard practice and regress XRP returns on date t on the control variables measured at t and one lag of XRP returns and the control variables. Gerritsen, Lugtigheid, and Walther (2021) also consider a correction for first order autocorrelation to the Constant Mean Return Model.

⁵¹ A well-accepted method for performing the event study is to estimate a regression model over some period of time (an “estimation window”) to quantify the typical relationship between the price movements of the relevant instrument and explanatory factors (often market-wide movements). See, for example, A. Craig MacKinlay, “Event Studies in Economics and Finance,” *Journal of Economic Literature* Vol. 35, 1997, pp. 13-39 at p. 15 (“For example, in an event study using daily data and the market model, the market model parameters could be estimated over the 120 days prior to the event.”). A 120 business day window corresponds to roughly six months of calendar time, or 180 days.

⁵² In my analysis, the estimation window (i.e., the 180-day window used to estimate the regression) will change with different dates of interest. This is typically referred to as a “rolling estimation window” (since the estimation window is “rolled forward” for each subsequent date of interest). By using a rolling estimation window, I allow for the relationship between the XRP prices and the explanatory factors, as well as the volatility of the random factor, ϵ_t , to change over time. Use of a rolling model to account for changing volatility and evolving relationships among factors is often applied and is accepted in peer-reviewed literature. See Phillip A. Braun, Daniel B. Nelson, & Alain M. Sunier, “Good News, Bad News, Volatility, and Betas,” *The Journal of Finance* Vol. 50 (5), 1995, pp. 1575-1603 at pp. 1575, 1597. Rolling estimation windows have been applied in the context of digital token event studies as well. See for example, Joo, Nishikawa, and Dandapani (2020) which uses a 365 day window. Gerritsen, Lugtigheid, and Walther (2021) uses a 49 day window.

⁵³ Consider the following hypothetical. Suppose that on some date t , it is announced that XRP has been listed on a new trading platform and XRP prices fall 5%. The Constant Mean Return Model will evaluate a return of -5% against the returns

models used in this analysis do, I consider the excess return of XRP prices beyond what can be explained by factors impacting the digital token market more broadly.^{54, 55}

FIGURE 7: MODEL SPECIFICATIONS

Model Number	Constant	Independent Variables					Lagged XRP	Lagged Independent Variables
		Account Growth	BTC	ETH	XLM	E-Index		
1	✓							
2	✓	✓						
3	✓		✓					
4	✓	✓	✓					
5	✓		✓	✓				
6	✓	✓	✓	✓				
7	✓		✓	✓	✓			
8	✓	✓	✓	✓	✓			
9	✓					✓		
10	✓	✓				✓		
11	✓						✓	
12	✓	✓					✓	✓
13	✓		✓				✓	✓
14	✓	✓	✓				✓	✓
15	✓		✓	✓			✓	✓
16	✓	✓	✓	✓			✓	✓
17	✓		✓	✓	✓		✓	✓
18	✓	✓	✓	✓	✓		✓	✓
19	✓					✓	✓	✓
20	✓	✓				✓	✓	✓

NOTES:

Check mark indicates the variable is included in the model. E-Index refers to an equal-weighted index across the returns of ADA, BNB, BTC, ETH, and XLM subject to data availability.

of the previous 180 days. Suppose it finds such a return to be “statistically significantly negative.” Evaluating the news of the platform listing using this model, I would conclude that there was a significantly negative return at the same time.

⁵⁴ Now suppose that on that same day it was announced that there had been a major hack to another trading platform, and this news adversely impacted digital tokens more broadly. Suppose BTC and ETH, in particular, drop 10% on date *t*. In a regression model which controls for those returns, the fact that XRP drops only 5% might indicate that its abnormal return – the difference between its actual and expected return – is actually significantly *positive*: its price dropped 5%, but it would be expected (say) to drop 10%, hence its abnormal return was actually +5%. Now evaluating the news of the platform listing using this other model, I would conclude that there was a significantly positive return at the same time.

⁵⁵ Ignoring stable coins, Bitcoin, Ether, Binance Coin, and Ada are currently the four largest digital tokens by market capitalization. For example, see “Today’s Cryptocurrency Prices by Market Cap,” CoinMarketCap, accessed October 4, 2021, <https://coinmarketcap.com>. Lumens is described as having a similar use case as XRP.

C. Identifying Pertinent News to Test

44. While there is generally a presumption that stock prices respond to new and relevant news about the company, one would not expect to see significant price changes accompanying every company announcement. For example, earnings announcements that are in line with investor expectations would not be expected to result in a significant price reaction.⁵⁶ An event study analysis can be used in these cases to determine if an earnings announcement (or other strategic announcements by a company about products or clients) was important news by investigating whether or not it is associated with a statistically significant price reaction.
45. A company can also disclose news other than earnings announcements. For example, many companies announce executive staff appointments, such as the appointment of a new CEO. Many companies engage in charitable activities, which they announce. In these cases, the price reaction following the event can be examined to determine if the announcement was “important.” If there is a statistically significant price reaction, and if certain conditions can be established,⁵⁷ then one might conclude that the market reacted significantly to the announcement. In these cases, it is often not necessary to determine *a priori* if the stock price is expected to react to the news. There is a general presumption that it would if the news were relevant and important. Significant price reactions may be taken as evidence that the news in question was important. However, a lack of significant price reaction to a specific news event is typically not generalized as evidence that the stock price does not react to all other news of the same general type or of news about the efforts, announcements, successes, or failures of the issuer of the stock.
46. In this case, the question of whether XRP prices respond to news about Ripple Labs and its business activities needs to be examined. The question therefore is not whether a particular Ripple action or event is associated with a particular XRP price response (as is the case in many event study disputes), but instead, whether Ripple actions or events are collectively associated with significant XRP price reactions. In other words, I do not presume that XRP prices might react to anything Ripple does; instead, I am investigating whether such a relationship exists.

⁵⁶ In line with this, the earnings announcement literature has studied the impact of forecast error on stock prices. Forecast error is typically measured based on the difference between actual earnings and expected earnings. See, e.g., Bradford Cornell and Wayne R. Landsman, “Security Price Response to Quarterly Earnings Announcements and Analysts’ Forecast Revisions,” *The Accounting Review* Vol. 64 (4), 1989, pp. 680-692, at p. 681 (“The purpose of this paper is to investigate the extent to which revisions of more distant earnings forecasts, as well as the current forecast error, affect stock prices.”) and p. 687 (“the forecast error ... is given by $(EPS_{it} - E(EPS_{it}|\theta_0))/P_{it}$, where EPS_{it} is the realized quarterly earnings per share, $E(EPS_{it}|\theta_0)$ is the mean pre-announcement IBES consensus forecast of EPS_{it} , ...”).

⁵⁷ Such conditions may include: (i) if there is no other confounding news that day which might explain such movement, (ii) if there is no evidence that the announcement had been leaked or anticipated by the market, and (iii) if there is a plausible explanation as to why the market might react to this announcement.

47. My statistical analysis begins with the hypothesis that there is no link – that the XRP market is independent of news about Ripple Labs.⁵⁸ I will then investigate the extent to which the available data are consistent with that hypothesis, or if the hypothesis of independence should be rejected.
48. I first identify the types of news that are relevant for the purpose of testing this relationship. I summarize the news identification process below:
- a. I start with the news which Ripple Labs has identified to be important by virtue of (i) having issued a press release about the event, or (ii) having written about it on its Insights/News page, or (iii) having linked to a third-party news outlet in its curated Newsroom page. By limiting myself to this set of news, I am not taking the position that other events are necessarily “unimportant.” I simply assume that based on its understanding of its business and industry, Ripple had some basis to highlight certain events and not others.
 - b. I then classify these news announcements into the following categories:
 - **Acquisition & Investment:** announcement of an acquisition or investment made by Ripple Labs, including through its development arm Xpring
 - **Case Study:** discussion of a customer experience or use case of XRP or other Ripple Labs products
 - **Charity:** announcement of a charitable endeavor or donation by Ripple
 - **Corporate Activity & Announcement:** miscellaneous corporate announcement or activity not related to Ripple’s products or new customers
 - **Customer & Product:** announcement related to new customer relationship (e.g., financial institutions or money centers often described as “partnering” with Ripple Labs) or products, including enhancements to the XRP ledger protocol
 - **Litigation:** news of litigation or regulatory enforcement involving Ripple Labs
 - **Market Commentary & Company Overview:** general commentary of the digital token market or Ripple Labs
 - **Markets Report:** a quarterly markets report published by Ripple
 - **Milestone:** key event in the history of Ripple Labs not related to products or customers

⁵⁸ Throughout this report, the phrase “XRP market” should be understood to mean specifically XRP *prices*, as distinct from other market considerations such as volume or liquidity.

- **Miscellaneous:** other announcement not otherwise categorized
- **Other Initiative:** initiative not primarily described as being related to the commercialization or promotion of Ripple’s products or technology in the XRP ecosystem; includes cases of Ripple Labs joining existing interest groups
- **Office and Staff Announcement:** announcement of executive staff changes or the opening of a new office
- **Ripple Commercialization Initiative:** initiative launched by Ripple Labs primarily described as being related to the commercialization or promotion of Ripple’s products or technology in the XRP ecosystem
- **Trading Platform:** announcement that XRP is available for trading on a new digital asset trading platform

I acknowledge that such categorizations rely on judgment. However, I show in VI.F.3 that my results are robust to alternative categorization choices.

- c. Finally, I identify any announcements within a category that should be excluded from the analysis. There are two reasons to exclude an announcement. First, the announcement may substantially repeat a previous announcement; I term such announcements “stale.” Second, the nature of the announcement may not have a particular directional implication for XRP prices, even assuming the hypothesis of independence is false. I describe such announcements as “direction uncertain.”

I acknowledge again that these considerations require judgment. I show in Appendix E that my results are robust to these exclusions.

49. My initial set of sources consists of 72 Press Releases, 298 Insight Articles, and 323 Newsroom Articles for a total of 693 sources published prior to December 22, 2020.⁵⁹ I exclude ten of these sources from my analysis: eight are excluded because the articles are no longer available, one is excluded because it is not available in English, and one is excluded because I could not determine its exact publication date (a review of its content indicates that it would not prove relevant anyway). These exclusions are listed in Figure 8.⁶⁰ My final set of sources thus consists of 683 documents which I group into 514 events.⁶¹ These are listed in Appendix C.

⁵⁹ On December 22, 2020 the SEC announced its action against Ripple Labs, which may have had direct effects on XRP prices, over and above any effect it may have on those tokens through an effect on Ripple. I therefore limit my analysis to events reported before December 22, 2020.

⁶⁰ In a handful of additional cases the link from the Ripple Newsroom no longer works, however an internet search revealed articles of the same title from the same source. I have included those in my analysis.

⁶¹ Some events are covered by multiple documents, hence there are fewer events than documents.

FIGURE 8: ARTICLES CLASSIFIED AS NOT AVAILABLE

Date	Headline	Source	Reason for Exclusion
8/23/2020	Ripple, A Blockchain-Powered Cross-Border Payments, Addresses an Increasing Need for Immigrant Remittances in the Japanese Market	Ripple Newsroom	Document not in English
n.a.	Ripple and XRP Are More Stable Than You Think	Ripple Newsroom	Document Unavailable
10/14/2016	Bloomberg Markets: Next President Must Have Fintech Plan	Ripple Newsroom	Document Unavailable
6/23/2016	Bloomberg Advantage: Larsen on the Internet of Value	Ripple Newsroom	Document Unavailable
4/28/2015	Building the Value Web with Open Standards	Ripple Newsroom	Document Unavailable
n.a.	Top Five Trends for Payments in 2015	Ripple Newsroom	Document Unavailable
n.a.	Why Do Banks Prefer Ripple Over Bitcoin?	Ripple Newsroom	Document Unavailable
n.a.	Cross-Border Payments Due For Disruption	Ripple Newsroom	Date Indeterminable**
n.a.	Bitcoin Makes Gains With Merchants	Ripple Newsroom	Document Unavailable
9/27/2018	Ripple for Good Supports Education and Financial Inclusion with \$100 Million Commitment	Ripple Insights	Document Unavailable

Notes:

** This article is available as part of a report dated spring 2015. I am not able to determine an exact publishing date, so I exclude the article from my analysis, despite its still being available.

50. Below I test the correlation between XRP returns and news announcements in those categories related more directly to XRP, such as Customer & Product. If the null hypothesis of independence is false, then I should find a statistically significant correlation; if it is true, then I should not. For certain other categories, such as general market commentary (often written by third parties and which does not break new information), it seems self-evident that there should be no meaningful connection with the XRP market in any case, hence testing such categories is not informative.
51. It is important to consider the qualitative direction of the news I am evaluating. As a self-selected (by Ripple) set of news, it is strongly biased in favor of “good” news or at worst “neutral” news. Ripple may announce when customers are added to its network, but it may choose not to announce if a customer leaves its network. If the XRP market reacts to this “good” news, then it presumably means that XRP prices increase, they do not decrease. I will thus be testing whether “good news” is correlated with significant *positive* XRP returns, not negative returns.⁶²

⁶² There is always the subtle possibility that news which appears superficially “good” is nevertheless disappointing to the market. If a company announces an increase in earnings of \$0.02 per share when the market had expected \$0.05, it is possible that such an announcement might lead to a decrease in the stock price. Likewise, it might be that when Ripple announces a partnership with 7 banks, the market had expected 20. My analysis conservatively assumes that what is superficially “good news” should be met with positive XRP returns. I do not consider a negative return (even if it is significant) to be evidence in support of the proposition that the XRP market reacts to Ripple. I will test for correlation with negative returns as a robustness check.

D. Testing for XRP Price Reactions to Ripple News

52. As I explained above, my analysis examines whether instances of Ripple news coincide with significant XRP price changes more frequently than random chance could explain. Consider the following “jar of marbles” example as an illustration of the framework for my statistical analysis:
- a. Imagine a jar with one thousand marbles. Nine hundred are blue, and they are mixed with one hundred red marbles. From this jar of marbles, if one were to draw a marble at random, the likelihood of drawing a red marble is 10% since 10% of all the marbles are red.
 - b. Now imagine 10 marbles are drawn *at random*. Since 10% of all the marbles are red, we would expect to find 1 red marble in this group of 10 (as 10% of 10), as shown in Figure 9. However, as with most experiments that involve randomness, it is possible that we may have two or three. We could likely find no red marbles. It’s even theoretically possible to draw 10 red marbles, though that is less likely than winning the lottery.

FIGURE 9: IN A RANDOM DRAW OF 10 MARBLES, ONE IS EXPECTED TO BE RED

- c. The likelihood of all outcomes, from having 0 red marbles to having 10, is well understood by statisticians, if the draws are *random*.⁶³ Across the range of possible outcomes, some are more likely than others. For example, suppose we find 5 of the 10 marbles are red, not 1 as expected, as shown in Figure 10. While having 5 instead of 1 may not seem like a significant outcome, in fact it is. The probability of drawing 5 or more red marbles at random is about 0.15%. That is less likely than two people sharing the same birthday. Against the common academic standard of 5% significance, we would say that this outcome is statistical evidence that the draws were not, in fact, random.

FIGURE 10: DRAWING 5 RED MARBLES IS STATISTICALLY SIGNIFICANT EVIDENCE THAT THE DRAW WAS NOT RANDOM

53. In the matter at hand, we do not have marbles which might be red, we have days which might have a significant (positive) XRP return. And rather than draw those days at random, I draw them based on whether there is Ripple Labs news as identified from my news identification process discussed above.

⁶³ Without replacement, each draw of marbles from the jar changes, however slightly, the probability that the next draw will be red. This complexity separates the binomial distribution (which assumes draws with replacement) from the hypergeometric distribution (which assumes draws without replacement).

54. Between May 5, 2014 (the first instance of news in my set) and December 20, 2020 (the last instance of news in my set before the SEC announced its action against Ripple Labs) there are 2,422 trading days (for illustrative purposes, imagine it is an even 2,500 days). For each of those days, I estimate the regression models that I described above based on the previous 180 trading days.⁶⁴ Each model generates an estimated abnormal return on each day, and a measure of the statistical likelihood of that abnormal return. I thus obtain from each model a set of days which have statistically significant positive XRP returns. We can think of this as the “set of red marbles” created by each model.
55. Suppose that a given model classifies 225, or 9%, of those 2,500 returns as significantly positive. Suppose that during the same period, 100 days have pertinent Ripple Labs news. If XRP returns are independent of Ripple Labs news, then we would expect 9 of those 100 “news days” to also have “significant returns” since 9% of all days have significant returns. In other words, if there is no relationship between “news” and “returns,” random chance still suggests that there will be some small overlap between those sets, and statistics tells us what that overlap should be. This random overlap is shown in Figure 11.

FIGURE 11: THE DEGREE OF OVERLAP IS SMALL IF NEWS EVENTS AND MARKET RETURNS ARE UNRELATED

⁶⁴ Note that not every statistical model I consider can be estimated over this entire period. Models which use the returns on certain other digital tokens as controls, for example, cannot be estimate before price data for those tokens become available.

56. But suppose that rather than 9, I find 25 significant returns among the 100 news days. How likely is such an outcome if the XRP market is independent of Ripple Labs? This is exactly analogous to the jar of marbles example: from a jar with 2,500 marbles, with just 225 of them being red, if 100 marbles are drawn at random, how likely is it that 25 or more would be red? If it is unlikely – if, say, the probability of that outcome is less than 5% - then this would be evidence that the draw was *not* random. In the case of XRP returns and Ripple Labs news, this would be evidence that there is a statistically significant relationship or correlation between Ripple Labs news and XRP returns. Figure 12 illustrates such a statistically significant overlap.

FIGURE 12: A LARGE OVERLAP IS STATISTICALLY SIGNIFICANT EVIDENCE THAT NEWS AND RETURNS ARE RELATED

57. To have 25 or more red marbles *from a random draw* is highly unlikely: the probability is just 0.0001%, or about one in 1,000,000, far beyond the common academic standard of 5% significance. To put that in perspective, the probability that two people selected at random share the same birthday is about 2,500 times greater. Such a result is statistical evidence that the draw was not random and is evidence of a statistically significant correlation between Ripple news and XRP returns. This result is effectively what I find below.

58. In summary, my analysis first selects different categories of news event, determines how many of those correspond to significantly positive XRP returns according to different regression models I consider, and then calculates how likely that outcome is. If the likelihood is less than 5%, I will conclude that there is a statistically significant (positive) correlation between the news events in question and XRP returns.

E. Summary of the Empirical Methodology

59. I implement the statistical framework described above with the following steps.
60. First, I specify the regression model of XRP returns. As explained in Section V.B above, I consider 20 different models estimated using 180 day “estimation windows.” As shown in Appendix E, my conclusions are robust to longer and shorter estimation windows.
61. Second, I specify the “event window,” i.e., the window over which to measure the changes in XRP prices following a news event. As discussed above, I consider event windows over multiple days: date t (i.e., a one-day event window coinciding with the day of the news event), dates t and $t + 1$ (i.e., a two-day event window), and dates t , $t + 1$, and $t + 2$ (i.e., a three-day event window). As shown in Appendix E, my conclusions are robust to longer and shorter event windows.
62. Third, I estimate the (cumulative) abnormal returns for each trading day over the corresponding event window and determine which are significant. I determine the significance of abnormal returns using two approaches:
- Parametric Approach:** assesses the abnormal return against the significant thresholds from the t -distribution (approximately 1.64 for a one-sided test and 1.96 for a two-sided test).⁶⁵ This approach is common practice in academic studies.⁶⁶
 - Nonparametric Approach:** assesses the abnormal return against the distribution of standardized abnormal returns observed over the 180 days used to estimate the regression model.
63. For both the parametric and nonparametric approaches, I evaluate abnormal returns at the 5% significance level. For a given significance level, I classify date t as “significantly positive” if any of its

⁶⁵ The “one-sided” test classifies a return as significant if there is only a 5% probability of drawing a greater (more positive) return. The “two-sided” test classifies a return as significant if there is only a 5% probability of drawing a more extreme (whether positive or negative) return. When using the “two-sided” standard, I continue to restrict myself only to positive returns, unless otherwise noted.

⁶⁶ Under general conditions this approach is appropriate. However, those general conditions may not apply in this case. In particular, XRP returns may not be normally distributed. To account for this possibility, the nonparametric method compares the standardized abnormal return from the event window with the distribution of standardized abnormal returns from the estimation data.

cumulative returns over a one-, two-, or three-day event window is significantly positive and none of its returns over those windows is significantly negative.

64. Finally, I examine the interaction between the set of news days I have identified and the set of days with significant positive XRP returns. If there is a relationship between Ripple's actions and XRP returns, then I would expect that (presumptively positive) news would be significantly associated with positive returns. I would not expect that such news would be significantly associated with negative returns, and I consider this robustness check below.

VI. XRP Prices React to News about Ripple's Actions

65. In this section, I describe the results of my analysis. I find that across major milestones in the history of Ripple Labs and across those categories of news more directly related to XRP's proposed use cases, there is statistically significant evidence that the price of XRP reacts to news of Ripple's actions. This holds for nearly all statistical models at any reasonable significance level.
66. In no case do I find a significant correlation between news about Ripple Labs and XRP's negative returns. In no case do I find a significant correlation between news about Ripple Labs and XRP's returns in the days before the news. Furthermore, I find that my results are robust to possible errors in the classification of news events.
67. Taken together, my results indicate that the price of XRP reacts to the news about actions of Ripple Labs. I therefore reject the hypothesis that XRP prices are independent of Ripple Labs.

A. XRP Prices Reacted to Key Milestones in Ripple's History

68. Figure 13 lists eight key corporate milestones in the history of Ripple Labs.⁶⁷ These milestones include Ripple's funding rounds, its joint venture with SBI Holdings, the licensing by New York State, and its

⁶⁷ I identify nine milestone events in my data, listed in Appendix C. On 5/16/2017, Ripple announces its plan to escrow 55 billion XRP tokens. A Newsroom article from 5/26/2017 again reports Ripple's plan to escrow 55 billion XRP tokens. I exclude the 5/26/2017 event from my analysis as stale. See Brad Garlinghouse, "Ripple to Place 55 Billion XRP in Escrow to Ensure Certainty of Total XRP Supply," ripple.com insights, May 16, 2017, accessed 10/4/2021, <https://ripple.com/insights/ripple-to-place-55-billion-xrp-in-escrow-to-ensure-certainty-into-total-xrp-supply/> and Ari Levy, "Bitcoin rival Ripple is suddenly sitting on billions of dollars worth of cryptocurrency," CNBC, May 26, 2017, accessed 10/4/2021, <https://www.cnbc.com/2017/05/26/bitcoin-rival-ripple-is-sitting-on-many-billions-of-dollars-of-xrp.html>.

decision to escrow 55 billion XRP tokens. If the XRP market is independent of Ripple Labs, then there is no reason that XRP prices should react to any of these events.

FIGURE 13: KEY MILESTONE EVENTS

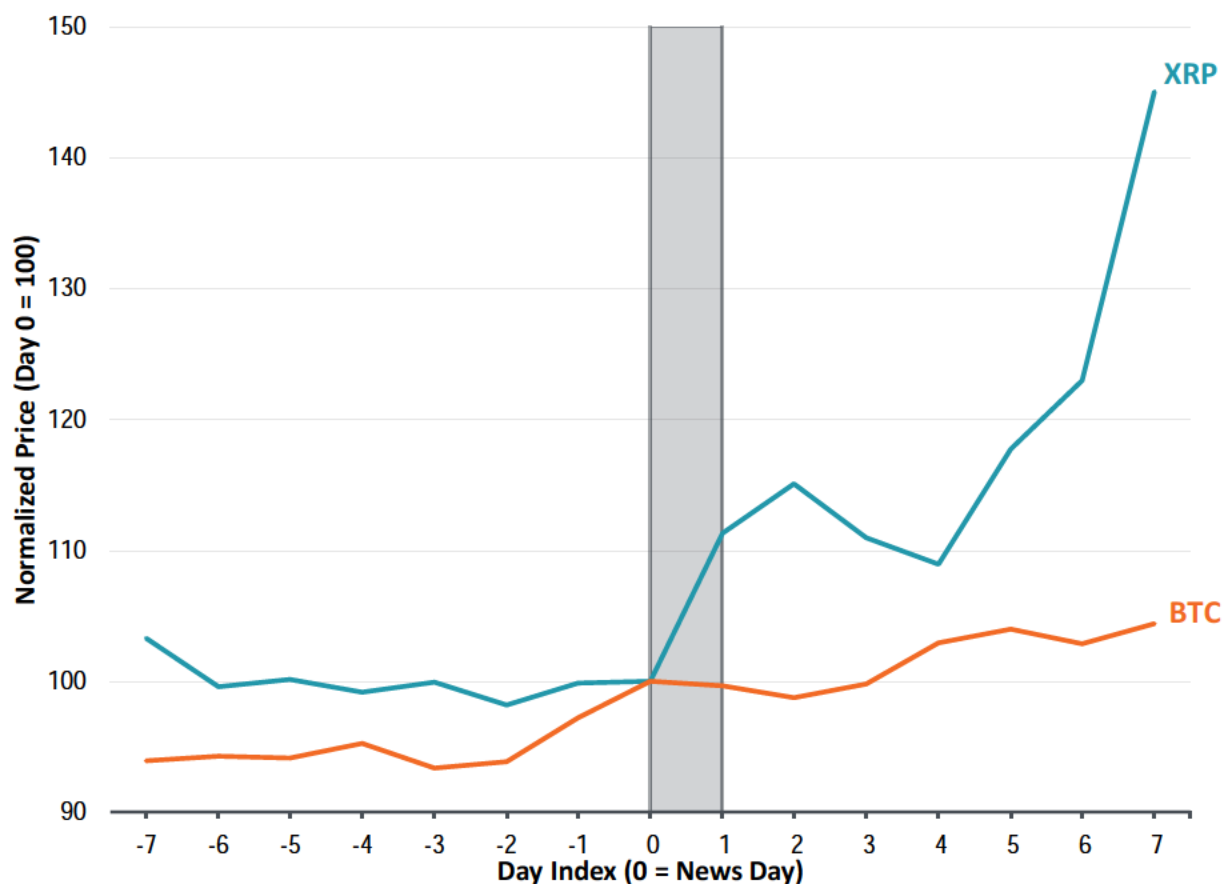
Event Date	Event	Stale?	Representative Document	
			ID	Headline
5/18/2015	Series A Funding		7585	Ripple Labs Closes \$28 Million Series A Funding Round
10/6/2015	Santander Investment		7580	Ripple Adds Santander InnoVentures Fund as Series A Investor
1/29/2016	SBI Holdings Deal		7578	Ripple Strikes Multi-National Deal with SBI Holdings to Meet Growing Demand for Ripple Solutions Across Asia
6/13/2016	New York BitLicense		8527	Ripple Receives New York's First BitLicense for an Institutional Use Case of Digital Assets
9/15/2016	Series B Funding		7573	Ripple Raises \$55 Million in Series B Funding
5/16/2017	Escrow Announcement		8463	Ripple to Place 55 Billion XRP in Escrow to Ensure Certainty of Total XRP Supply
5/26/2017	Escrow Announcement	✓	7793	Bitcoin rival Ripple is suddenly sitting on billions of dollars worth of cryptocurrency
12/8/2017	Escrow Action		8432	Ripple Escrows 55 Billion XRP for Supply Predictability
12/20/2019	Series C Funding		8329	Ripple Caps Record Year With \$200 Million Series C Funding

69. Figure 14 plots the average XRP price path for the week leading up to and the week following these milestones and compares it with the average BTC price path.⁶⁸ The average XRP price path was essentially flat for the week leading up to a milestone event, then jumps 11% on the milestone date, holds fairly steady for a couple of days, and then appears to increase even further. By contrast, the prices of Bitcoin (commonly known to be the largest digital token by market cap)⁶⁹ are comparatively flat around these milestone events, which indicates that the movements in XRP prices are not attributable to movements in the broader digital token market.

⁶⁸ For each milestone, I collect prices for the seven days leading up to and following the milestone date. I then normalize the price to 100 at the beginning of the news day (equivalently, the end of the day before the news day). The chart plots the simple average across these normalized price series.

⁶⁹ See "Today's Cryptocurrency Prices by Market Cap," CoinMarketCap, accessed October 1, 2021, <https://coinmarketcap.com/>.

FIGURE 14: AVERAGE NORMALIZED PRICE BEFORE AND AFTER RIPPLE MILESTONES EVENTS



Note: Day labels indicate the beginning of the specified day. News Day is shaded in gray. News is released at some point between Day 0 and 1.

70. The first event, Series A funding, is dated May 18, 2015 and the last event, Series C funding, is dated December 20, 2019. This spans 1,678 trading days. I consider 20 different statistical models of XRP returns, each of which generate somewhat different estimates of the abnormal XRP return on each of those days. I then evaluate those abnormal returns at the one-sided 5% significance level determined both parametrically and nonparametrically. The result is 40 potentially different sets of "significant positive XRP return days."⁷⁰ As an example, applying the Constant Mean Return Model (Model 1) and the one-sided 5% significance level determined parametrically yields 146 days as "significantly positive."

⁷⁰ This follows as $40 = 20 \text{ models} \times 2 \text{ methods of determining critical values}$.

71. Each model measured under each method thus generates a probability of finding a significantly positive XRP day at random. For the Constant Mean Return Model we have been considering, this is 8.7% (146/1,678).
72. If I draw eight days at random from the 1,678 days which span May 18, 2015 through December 20, 2019 where the chance that any one is significant is just 8.7%, the most likely outcome is that I would not draw a single significantly positive day; for the Constant Mean Return Model, the probability of drawing 0 significantly positive days is 48.2%, or 1 in 2.1.
73. However, I do not draw the eight days at random. Rather, I draw the eight days corresponding to the eight milestone events described above. And in that set of eight days, I find six days with significantly positive returns. Where my "success rate" if I were picking these days at random should be 8.7%, my actual success rate is 75% (6/8). The odds of drawing six or more by random chance are about 1 in 100,000, or 0.0010%. The usual scientific standard would consider any outcome with a likelihood of less than 5%, or 1 in 20, as "statistically significant." While it is not impossible to draw 6 by random luck, the more likely explanation is that there is a relationship between this news about Ripple and XRP prices.
74. Figure 15 presents the results of my event study and statistical analysis. A check mark indicates that I find statistically significant evidence of a correlation between XRP price increases and Ripple milestone events. In other words, I can reject the hypothesis that XRP prices are independent of these eight Milestone events.
75. Put another way, the results in Figure 15 mean that statistically I can reject the hypothesis that it is simply coincidence that XRP prices significantly increase at the same time that these events are publicized; there is almost certainly a common factor between them. From an economic perspective, one explanation of course is that news of the event causes the XRP price response.⁷¹
76. Observing a relationship between XRP prices and Ripple milestone events has important economic implications for the matter at hand. If the XRP market looks to Ripple Labs to create value, then it becomes understandable why certain corporate developments would impact XRP prices. However, if the XRP market does not look to Ripple Labs to create value, then it is difficult to understand why XRP prices would react to these events.

⁷¹ Another explanation would be the reverse – that somehow the news of these events is released in response to XRP price increases but otherwise would not have been released on these days, or that the "price causes the news." A third explanation would be that there is some other factor – an "X factor" – which is driving both these events and the XRP market. These events, of course, are disparate in their nature, including venture funding rounds involving multiple investors, joint ventures in Asia, and licensing decisions made by the state of New York. Many of them also represent the culmination of long processes.

FIGURE 15: XRP PRICES REACT TO RIPPLE MILESTONE EVENTS

Model Number	Parametric	Nonparametric
1	✓	✓
2	✓	✓
3	✓	✓
4	✓	✓
5	✓	✓
6	✓	✓
7	✓	✓
8	✓	✓
9	✓	✓
10	✓	✓
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16	✓	✓
17	✓	✓
18	✓	✓
19	✓	✓
20	✓	✓

Notes:

✓

Indicates significance at the 5% level.

Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

B. XRP Prices Reacted to Digital Asset Trading Platform Listings

77. I have identified eleven announcements related to new listings of XRP on trading platforms.⁷² I examine if there is a significant correlation between these announcements and XRP prices.

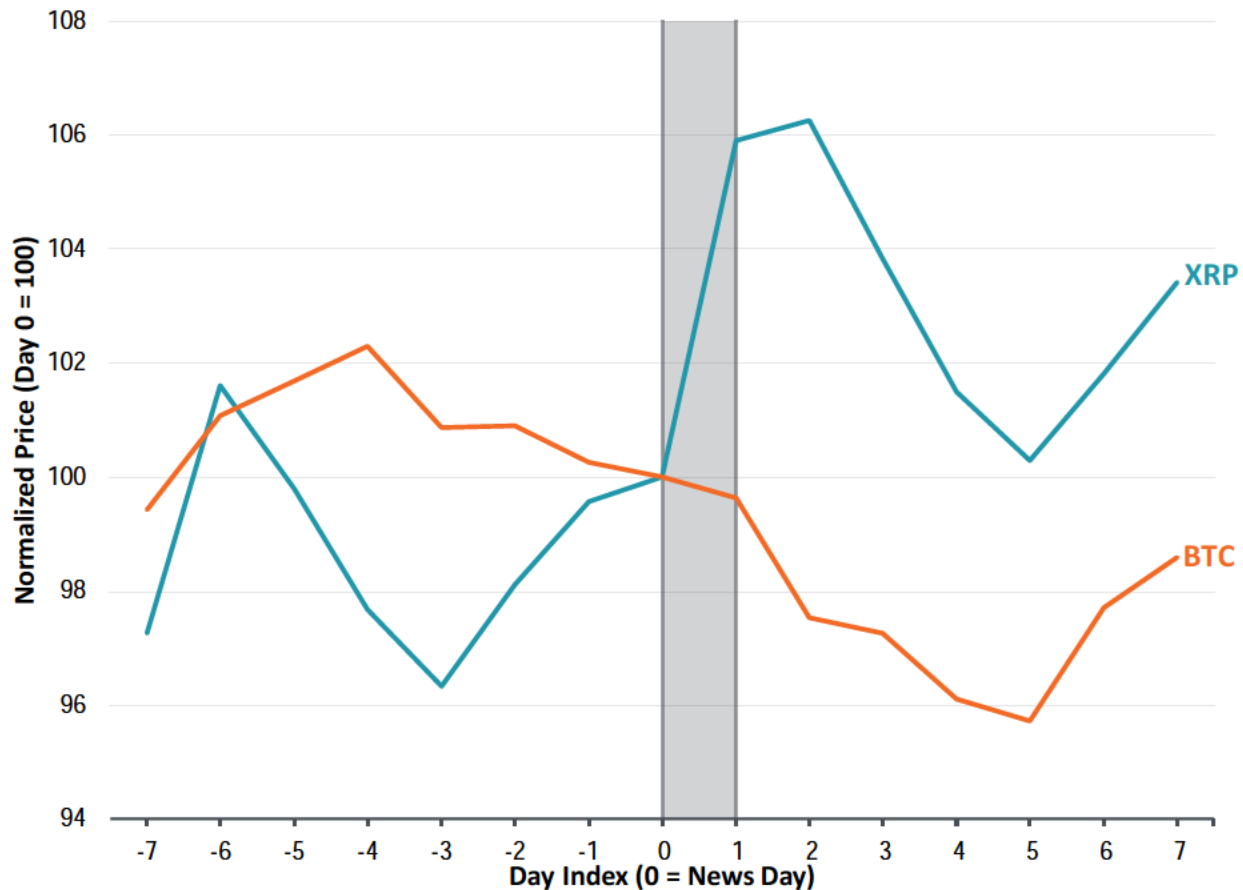
FIGURE 16: KEY TRADING PLATFORM LISTING EVENTS

Event Date	Event	Ripple Action?	Representative Document	
			ID	Headline
2/29/2016	Partnership with Crypto Facilities	✓	8539	Ripple Partners with Crypto Facilities for XRP Derivatives
10/9/2016	Derivatives Listing on Crypto Facilities	✓	8501	Ripple Announces XRP Futures Trading on Crypto Facilities
10/27/2016	Listing on Coincheck		8496	Coincheck Lists XRP on Its Digital Asset Exchange
1/10/2017	Listing on Bitstamp with 0% Fees	✓	8483	Bitstamp Now Trading XRP with 0% Fees
5/18/2017	Listing on Six New Exchanges	✓	7567	XRP Liquidity to Increase With Listings on Six New Exchanges
8/31/2017	Partnership with Bitcoin IRA, Kingdom Trust		8452	It's Never Been Easier to Access and Store XRP
12/21/2017	Listing on CEX.IO, GMOCoin, Huobi.pro		8426	XRP Now Available on 50 Exchanges Worldwide
1/30/2018	Listing on SBI Virtual Currencies		8419	SBI Virtual Currencies to Exclusively List XRP at Launch
3/28/2018	Listing on Uphold		8410	XRP Ecosystem Grows with New Listing on Uphold
8/16/2018	Listing on Bittrex, Bitso, and Coins.ph	✓	7550	xRapid Brings on Three New Exchange Partners
2/12/2020	Partnership with BRD Wallet	✓	8323	BRD Supports XRP and Launches Enterprise Expansion

78. Figure 17 plots the average XRP price path for the week leading up to and the week following these eleven announcements and compares it with the average BTC price path. The XRP price on average jumps 6% on these dates, though the bump appears to be temporary. By contrast, Bitcoin prices are trending down on average and show no particular reaction to these XRP listings.

⁷² On January 10, 2017, an Insight article announces that XRP is newly listed on Bitstamp. An announcement dated February 16, 2017 extends that by announcing that a particular trading pair (XRP/BTC) is newly available on that trading platform. I regard this second announcement as qualitatively different from announcing a listing on a new trading platform, hence I do not include it in my analysis.

FIGURE 17: AVERAGE NORMALIZED PRICE BEFORE AND AFTER TRADING PLATFORM LISTINGS



Note: Day labels indicate the beginning of the specified day. News Day is shaded in gray. News is released at some point between Day 0 and 1.

79. The first trading platform announcement is dated February 29, 2016, and the last February 12, 2020, spanning 1,445 days. Using again the example of the Constant Mean Return Model, this model identifies 123 days as being significantly positive (when assessed parametrically) over this period of time. Drawing eleven days at random, the most likely single outcome is to find just one significantly positive day—the probability of this outcome is 39%. But among the eleven trading platform listing days, I find five significantly positive market days.⁷³ The probability of drawing five or more is just 0.13%, or about 1 in 800.

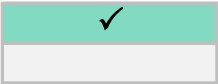
⁷³ By "market day," I mean a day with a statistically significant positive abnormal return.

80. Figure 18 presents the result of my event study and statistical analysis. A check mark indicates that I find a statistical evidence of a correlation between XRP prices and announcements of listings on new trading platforms. In other words, I can reject the hypothesis that XRP prices are independent of news of trading platform listings.

FIGURE 18: XRP PRICES REACT TO LISTINGS ON NEW TRADING PLATFORMS

Model Number	Parametric	Nonparametric
1	✓	✓
2	✓	✓
3	✓	✓
4	✓	✓
5	✓	✓
6	✓	✓
7	✓	✓
8	✓	✓
9	✓	✓
10	✓	✓
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16	✓	✓
17	✓	✓
18	✓	✓
19	✓	✓
20	✓	✓

Notes:



Indicates significance at the 5% level.

Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

81. Ripple Labs may not have been an active participant in every trading platform listing. But according to Ripple’s announcements, it appears to have been involved in at least some, and this is a type of action

which is significantly correlated with XRP prices. For example, in an Insight Article from October 10, 2016, Ripple writes:

“In February, Ripple formalized its partnership with Crypto Facilities, a London-based financial services firm that provides FCA-regulated risk management and trading solutions for digital assets. Today, Ripple is excited to announce that Crypto Facilities will be the first derivatives exchange to list regulated XRP futures contracts. To further establish digital assets as a new asset class, Crypto Facilities is also partnering with CME Group, which has invested in Ripple through its venture arm.”⁷⁴

82. In my review of these eleven announcements, I believe that six indicate involvement by Ripple.⁷⁵ Figure 19 reports the likelihood of the outcomes from this subset of trading platform listings. The subset of trading platform listings which indicate action by Ripple is significantly correlated with XRP prices. Once again, I can reject the hypothesis that XRP prices are independent of trading platform listings.

⁷⁴ “Ripple Announces XRP Futures Trading on Crypto Facilities,” Ripple.com Insights, October 10, 2016, accessed September 29, 2021, <https://ripple.com/insights/ripple-announces-xrp-futures-trading-crypto-facilities/>.

⁷⁵ I am not taking the position that Ripple was not involved in the other trading platform listings. I am simply identifying those six events for which my reading of the announcements suggests that Ripple likely was involved.

FIGURE 19: XRP PRICES REACT TO NEW TRADING PLATFORM LISTINGS INVOLVING RIPPLE LABS

Model Number	Parametric	Nonparametric
1	✓	✓
2	✓	✓
3	✓	✓
4	✓	✓
5	✓	✓
6	✓	✓
7	✓	✓
8	✓	✓
9	✓	✓
10	✓	✓
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16	✓	✓
17	✓	✓
18	✓	✓
19	✓	✓
20	✓	✓

Notes:

✓

Indicates significance at the 5% level.

Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

C. XRP Prices Reacted to Customer and Product Announcements

83. I have identified 85 announcements related to customer and product developments. It is not always clear if Ripple is an active participant or not. For example, Ripple’s first press release, dated May 5,

2014, is headlined “Ripple Labs Announces Fidor Bank AG as First Bank to Use the Ripple Protocol.”⁷⁶ The body of the announcement says that “Fidor Bank AG [is] the first bank to integrate Ripple,” and it goes on to define Ripple as “an open, decentralized payments protocol that enables anything of value to be traded through a global value web.” Reading this press release, one could interpret this as an example of a bank choosing to adopt an open source technology such that, in principle, Ripple Labs is in no way involved. In fact, the first several announcements by Ripple – AstroPay, GBI, CBW Bank, and Cross River Bank – read largely the same way.

84. However, following the announcements that CBW Bank and Cross River Bank were integrating the “Ripple protocol” – again defined as the decentralized ledger technology – Chris Larsen, then CEO of Ripple Labs, is quoted in a Newsroom Article saying, “It’s a big milestone...We’ve been working on our enterprise banking strategy for well over a year. It takes awhile for banks to get going.”⁷⁷ This would suggest that it was, at least in part, due to the efforts of Ripple Labs that some of these first institutions adopted the decentralized protocol.
85. One economic consideration is that not all product developments might be expected to lead directly to increased utilization of XRP. For example, some announce new validators on the XRP ledger; this is different from a new bank joining RippleNet. Also, two events appear to repeat old information and hence are effectively stale.⁷⁸ In all, from these 85 events, I exclude 8 as not relevant. These are listed in Figure 20. I note that my conclusions are qualitatively unchanged if these events are included; please see Appendix E.

⁷⁶ “Ripple Labs Announces Fidor Bank AG as First Bank to Use the Ripple Protocol,” ripple.com press center, May 5, 2014, accessed September 29, 2021, https://ripple.com/ripple_press/ripple-labs-announces-fidor-bank-ag-as-first-bank-to-use-the-ripple-protocol/.

⁷⁷ Biz Carson, “Two US banks are ready to embrace the Ripple protocol, allowing instant global money transfers,” Gigaom, September 24, 2014, accessed September 29, 2021, <https://gigaom.com/2014/09/24/two-us-banks-are-ready-to-embrace-the-ripple-protocol-allowing-instant-global-money-transfers/>.

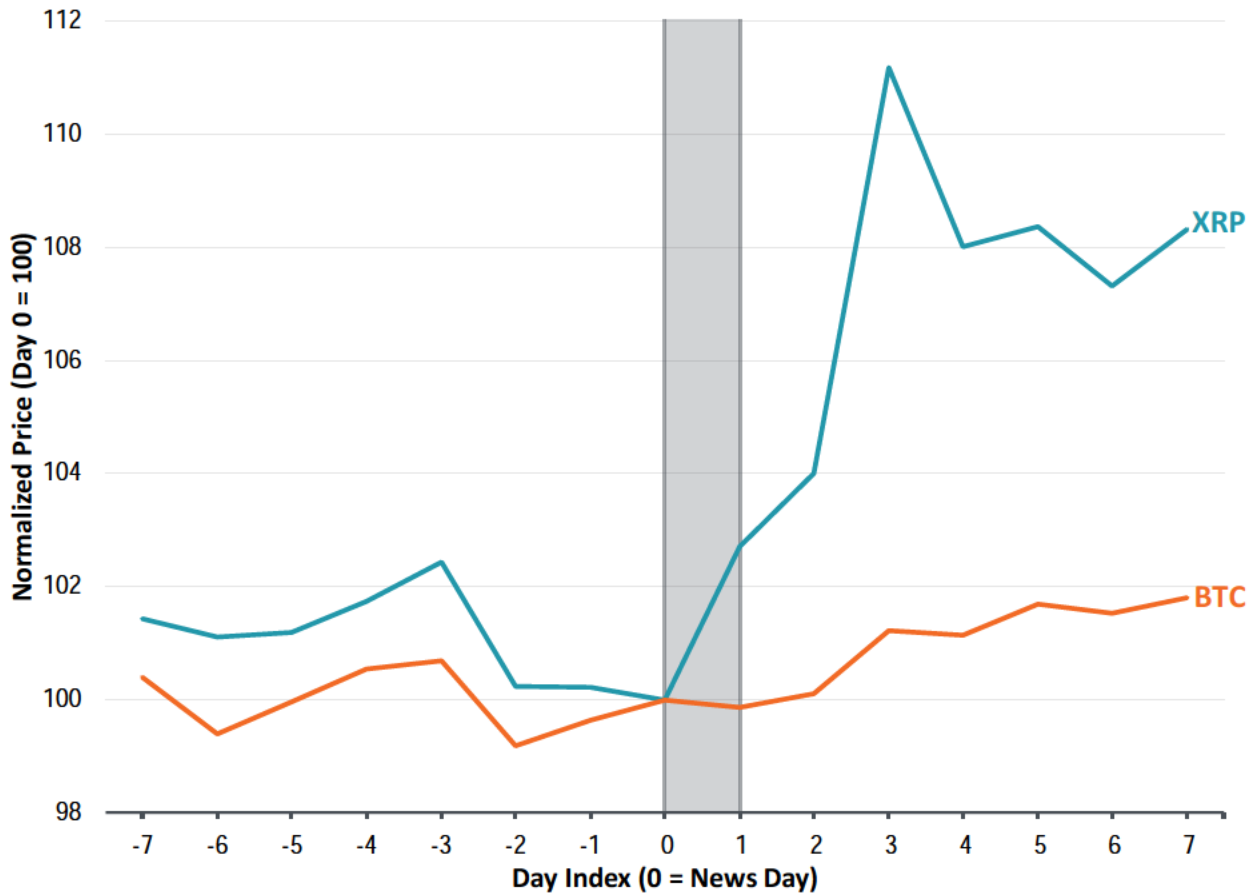
⁷⁸ An Insight Article from August 16, 2016 entitled “Multi-Signing in Ripple: A Q&A with David Schwartz” discusses an amendment to the XRP Ledger which had been recently adopted. It is not clear that Ripple Labs sponsored the amendment, but regardless, the amendment itself is not being newly proposed in this article. The second case is a Newsroom Article dated January 29, 2018 entitled “MoneyGram CEO Plans Waves with Ripple” which essentially repeats the news of January 11 from a Press Release headline titled, “Ripple and MoneyGram Partner to Modernize Payments.”⁷⁸ See, “Multi-Signing in Ripple: A Q&A with David Schwartz,” ripple.com insights, August 16, 2016, accessed September 29, 2021, <https://ripple.com/insights/multi-signing-ripple-qa-david-schwartz/>; PYMNTS, “MoneyGram CEO Plans Waves with Ripple,” pymnts.com, January 29, 2018, accessed September 29, 2021, <https://www.pymnts.com/news/2018/moneygram-ripple-cryptocurrency-blockchain-alex-holmes/>; “Ripple and MoneyGram Partner to Modernize Payments,” ripple.com press center, January 11, 2018, accessed September 29, 2021, https://ripple.com/ripple_press/ripple-and-moneygram-partner-to-modernize-payments/.

FIGURE 20: EXCLUDED CUSTOMER AND PRODUCT ANNOUNCEMENT EVENTS

Event Date	Event	Reason for Exclusion		ID	Representative Document Headline
		Stale	Direction Unclear		
1/12/2016	Earthport Launch of Ripple API		✓	8554	Earthport Launches Distributed Ledger Hub
4/12/2016	MIT Runs Ripple Validator		✓	7575	MIT Adopts Ripple Validator to Advance Consensus and Blockchain Research
8/16/2016	Recently Adopted XRP Ledger Amendment	✓		8514	Multi-Signing in Ripple: A Q&A with David Schwartz
11/16/2016	Improvement of RippleCharts		✓	8492	Ripple Announces An Upgrade to RippleCharts
5/11/2017	XRP Ledger Validator Updates		✓	8464	How We Are Further Decentralizing the XRP Ledger to Bolster Robustness for Enterprise Use
7/17/2017	Expansion of XRP Ledger Validator Nodes		✓	8458	XRP Ledger Decentralizes Further With Expansion to 55 Validator Nodes
1/29/2018	Pilot with MoneyGram	✓		7760	MoneyGram CEO Plans Waves With Ripple
2/21/2018	Ripple Releases White Papers		✓	7747	Ripple Papers Pledge New Start for \$40 Billion XRP

86. Figure 21 plots the average XRP price path for the week leading up to and week following these 77 announcements and compares it with the average BTC price path. The average XRP price path increases 3% on the announcement date but continues to increase thereafter, ending about 8% higher a week later. By contrast, Bitcoin prices are trending up slowly on average but show no particular reaction to these Ripple announcements.

FIGURE 21: AVERAGE NORMALIZED PRICE BEFORE AND AFTER CUSTOMER AND PRODUCT ANNOUNCEMENTS



Note: Day labels indicate the beginning of the specified day. News Day is shaded in gray. News is released at some point between Day 0 and 1.

87. Figure 22 presents the results of my event study and statistical analysis on customer and product announcements, leading me to reject the hypothesis that XRP prices are independent of these developments.

FIGURE 22: XRP PRICES REACT TO NEW CUSTOMER AND PRODUCT ANNOUNCEMENTS

Model Number	Parametric	Nonparametric
1	✓	✓
2	✓	✓
3	✓	✓
4	✓	✓
5	✓	✓
6	✓	✓
7	✓	✓
8	✓	✓
9	✓	✓
10	✓	✓
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16	✓	✓
17	✓	✓
18	✓	✓
19	✓	✓
20	✓	✓

Notes:

✓

Indicates significance at the 5% level.

Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

D. XRP Prices Reacted to Ripple's Commercialization Initiatives

88. Ripple Labs has launched a number of initiatives described as commercializing or promoting its technology and payment solutions, including some described as creating use-cases for XRP.⁷⁹ These include:

- The Global Payments Steering Group (GPSG), described in a Ripple press release as overseeing “the creation and maintenance of Ripple payment transaction rules, formalized standards for activity using Ripple, and other actions to support the implementation of Ripple payment capabilities.”⁸⁰
- The Infrastructure Innovation Initiative, described in a Newsroom article as “a team within [Ripple Labs] that will focus on providing Ripple’s DLT [Distributed Ledger Technology] and payments technology to central banks and market infrastructures. The initiative will enable regulators and financial institutions (FIs) to use Ripple’s technology to explore blockchain themselves and develop solutions.”⁸¹
- The Line of Credit, described in a Ripple Insight Article as “a new beta service on RippleNet that allows customers using On-Demand Liquidity (ODL) to source capital on-demand to initiate cross-border payments at scale using the digital asset XRP.”⁸²
- The RippleNet Accelerator Program, described in a Ripple Insight Article as “a unique reward for financial institutions that are the first in their markets to process and promote commercial payments on RippleNet...the RippleNet Accelerator Program is funded by \$300 million of XRP from Ripple’s XRP holdings.”⁸³

⁷⁹ By classifying these initiatives as “Ripple Commercialization Initiatives,” I am not taking the position that the initiatives were ultimately successful in commercializing Ripple’s technology or in creating use cases for the XRP token, merely that Ripple’s descriptions of these initiatives suggest that that would be a goal or objective of the program.

⁸⁰ “Major Banks Launch Global Payments Steering Group,” ripple.com press center, September 23, 2016, accessed September 29, 2021, https://ripple.com/ripple_press/major-banks-launch-global-payments-steering-group/.

⁸¹ PYMNTS, “Ripple Ramps Up Focus on Blockchain Infrastructure,” pymnts.com, December 21, 2017, accessed September 29, 2021, <https://www.pymnts.com/news/b2b-payments/2017/ripple-infrastructure-initiative/>.

⁸² “Fund Instant Cross-Border Payments With a Line of Credit From RippleNet,” ripple.com insights, October 8, 2020, accessed September 29, 2021, <https://ripple.com/insights/fund-instant-cross-border-payments-with-a-line-of-credit-from-rippletnet/>.

⁸³ “Ripple Rolls Out \$300M RippleNet Accelerator Program to Grow Volume and XRP Utility,” ripple.com insights, October 13, 2017, accessed September 29, 2021, <https://ripple.com/insights/ripple-rolls-300m-rippletnet-accelerator-program-grow-volume-xrp-utility/>.

- Xpring, described in a Ripple Insight Article as “a new initiative by Ripple that will invest in, incubate, acquire and provide grants to companies and projects run by proven entrepreneurs. Every entrepreneur will use the digital asset XRP and the XRP Ledger.”⁸⁴

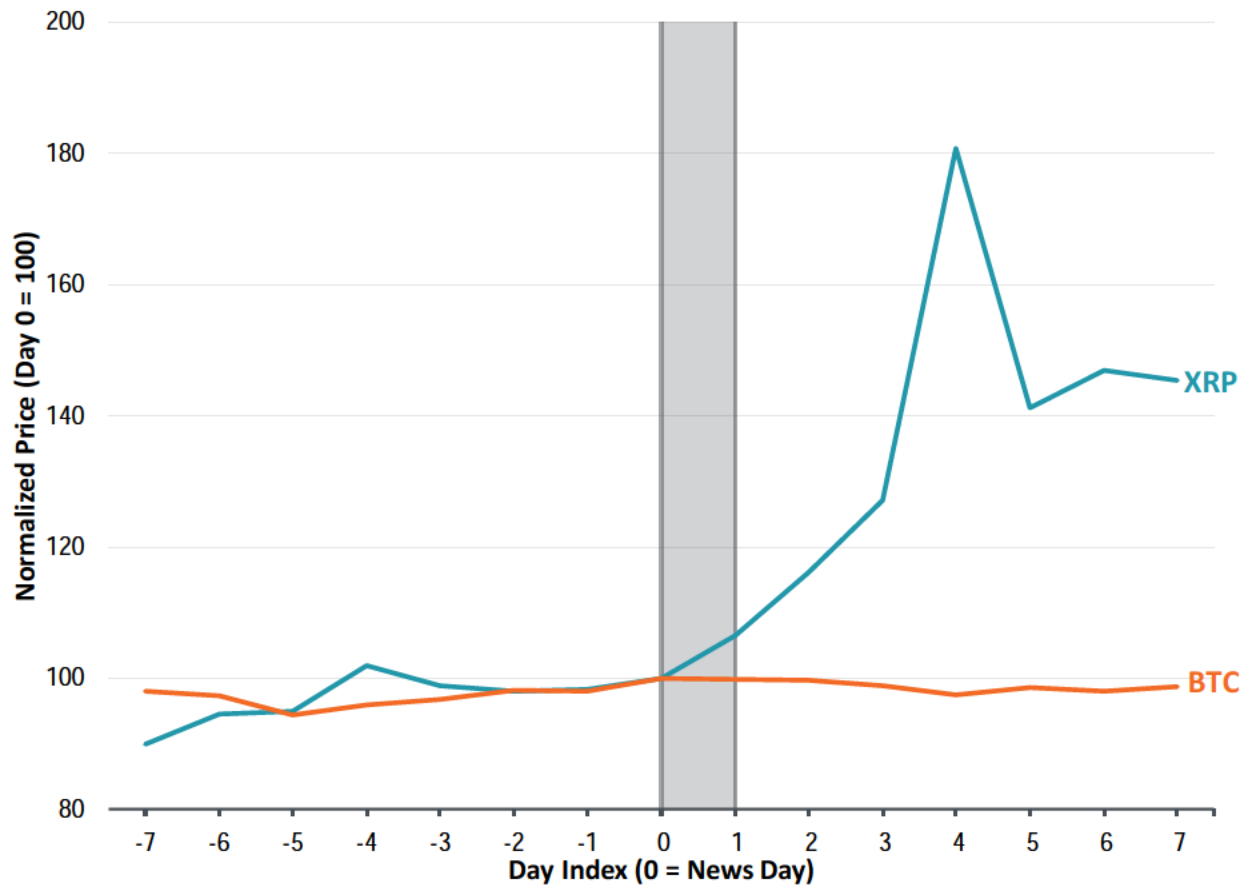
FIGURE 23: KEY RIPPLE COMMERCIALIZATION INITIATIVE EVENTS

Event Date	Event	Representative Document	
		ID	Headline
9/23/2016	Launch GPSG	7571	Major Banks Launch Global Payments Steering Group
3/30/2017	MUFG Joins GPSG	8469	MUFG Joins Ripple's Global Payments Steering Group
10/13/2017	Creation of RippleNet Accelerator Program	8446	Ripple Rolls Out \$300M RippleNet Accelerator Program to Grow Volume and XRP Utility
12/19/2017	Establish Infrastructure Innovation Initiative	8428	Exploring Innovation in Payment System Infrastructures
5/14/2018	Announce Xpring	8401	Welcome to Xpring
10/2/2019	Update to Xpring	8340	Announcing the Next Chapter of Xpring, Ripple's Developer Platform
10/8/2020	Launch RippleNet Line of Credit	8298	Fund Instant Cross-Border Payments With a Line of Credit From RippleNet

89. I have identified seven announcements related to these initiatives, either announcing their launch or some expansion to their program; these are listed in Figure 23. Figure 24 plots the average XRP price path for the week leading up to and the week following these announcements and compares it with the average Bitcoin price path. The difference is striking. Average XRP prices increase 7% on the day of the announcement, and one week later are about 50% higher. Bitcoin prices, on the other hand, do not appear to react at all.

⁸⁴ “Welcome to Xpring,” ripple.com insights, May 14, 2018, accessed September 29, 2021, <https://ripple.com/insights/welcome-to-xpring/>.

FIGURE 24: AVERAGE NORMALIZED PRICE PATH AROUND RIPPLE'S COMMERCIALIZATION INITIATIVES



Note: Day labels indicate the beginning of the specified day. News Day shaded in gray. News is released at some point between Day 0 and 1.

90. Figure 25 presents the results of my event study and statistical analysis on Ripple Commercialization Initiatives. The statistical evidence here is more mixed than the other news categories I have considered thus far, however, more than half of all models indicate a significantly positive correlation between Ripple Commercialization Initiatives and XRP prices.

FIGURE 25: XRP PRICES REACT TO RIPPLE'S COMMERCIALIZATION INITIATIVES

Model Number	Parametric	Nonparametric
1	✓	✓
2		
3	✓	✓
4		
5	✓	✓
6		
7	✓	✓
8		
9	✓	✓
10		
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16		
17	✓	✓
18		
19	✓	✓
20	✓	✓

Notes:

✓	Indicates significance at the 5% level.
	Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

91. By contrast, Ripple Labs has also launched initiatives which do not appear directly related to the commercialization or promotion of its technology, specifically, or to the creation of XRP use cases. These include:

- University Blockchain Research Initiative (UBRI), described in a Ripple press release as “a program comprised of collaborative partnerships with leading universities to support academic research, technical development and innovation in blockchain, cryptocurrency and digital

payments. Through the program, Ripple will donate \$50M to universities around the world to help shape the workforce of the future.”⁸⁵

- Research Consortium, described in a Newsroom Article which states “SBI Ripple Asia is forming a consortium that will research the use of distributed ledger technology in securities products...the new consortium will see joint efforts from 18 securities firms to research and commercialize applications of emerging technologies, particularly DLT [Distributed Ledger Technology], to improve efficiency for customers, while reducing operational cost.”⁸⁶
- Carbon Neutrality, described in a Ripple press release as “several initiatives to lead global finance toward a carbon-neutral future, including the launch of an open-source tool that helps enable any blockchain to decarbonize.”⁸⁷
- Ripple Labs periodically announces its participation with existing research initiatives or interest groups. I include such announcements in this analysis.

⁸⁵ “Ripple Announces \$50M University Blockchain Research Initiative,” ripple.com press center, June 4, 2018, accessed September 29, 2021, https://ripple.com/ripple_press/ripple-announces-50m-university-blockchain-research-initiative/.

⁸⁶ Wolfie Zhao, “SBI Ripple Asia Forms Consortium to Bring DLT to Securities,” CoinDesk, January 30, 2018, accessed September 29, 2021, <https://www.coindesk.com/markets/2018/01/30/sbi-ripple-asia-forms-consortium-to-bring-dlt-to-securities/>.

⁸⁷ “Ripple Leads Sustainability Agenda to Achieve Carbon Neutrality By 2030,” ripple.com press center, September 30, 2020, accessed September 29, 2021, <https://ripple.com/ripple-press/ripple-leads-sustainability-agenda-to-achieve-carbon-neutrality-by-2030/>.

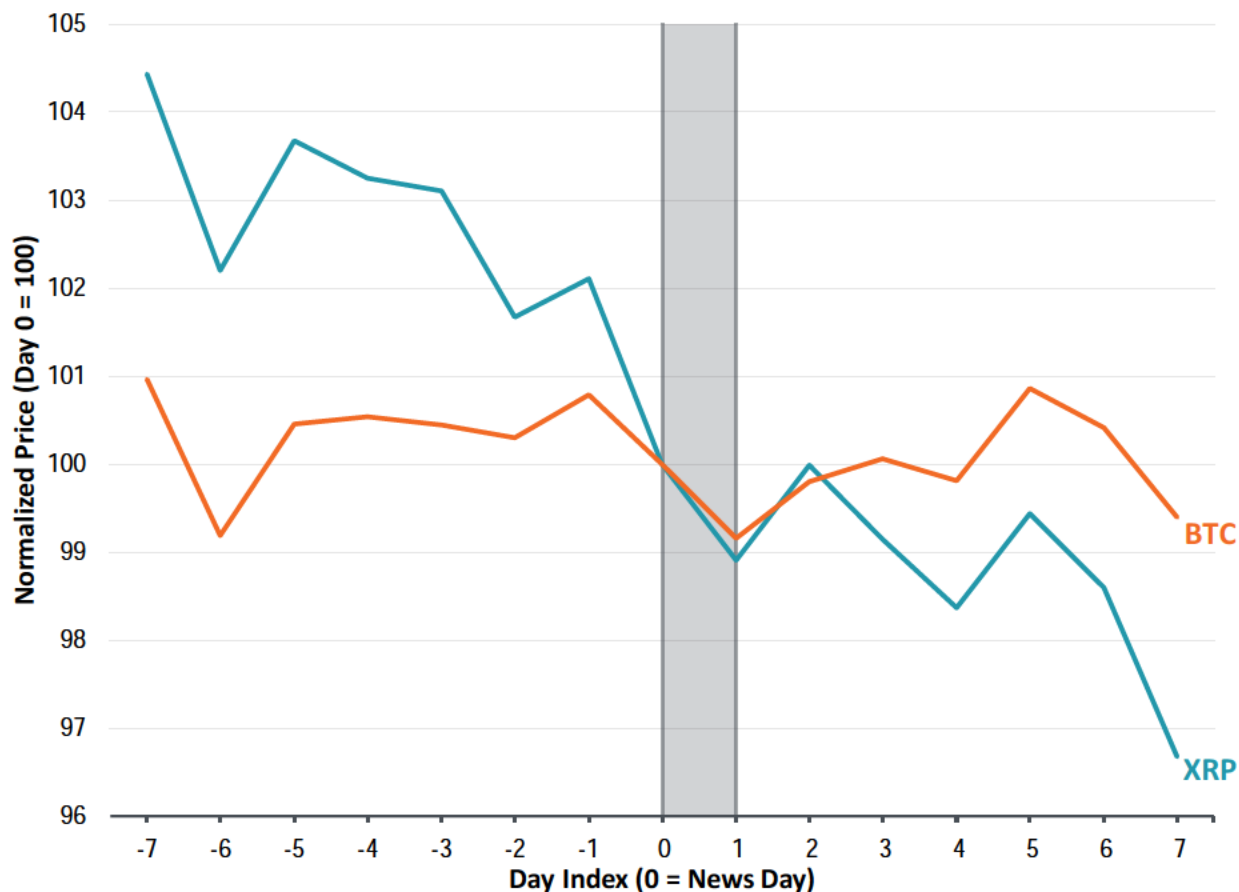
FIGURE 26: KEY OTHER INITIATIVE EVENTS

Event Date	Event	Stale?	Representative Document	
			ID	Headline
2/10/2015	Joins Center for Financial Services Innovation		8588	Ripple Labs joins the Center for Financial Services Innovation
2/12/2015	Joins W3C Web Payment Interest Group		7589	Ripple Labs Joins W3C Web Payment Interest Group to Help Set Standards for the Value Web
3/4/2015	Joins International Payments Framework Association		8587	Ripple Labs Joins International Payments Framework Association
6/15/2015	Ryan Zagone Elected to Faster Payments Task Force Steering		8575	Ripple Labs Elected to Fed Steering Committee for Faster Payments
1/30/2018	Creation of SBI Ripple Asia Consortium		7759	SBI Ripple Asia Forms Consortium to Bring DLT to Securities
3/28/2018	Joins Hyperledger Blockchain Consortium		7733	Ripple Joins Hyperledger Blockchain Consortium
6/4/2018	Launch University Blockchain Research Initiative		7552	Ripple Announces \$50M University Blockchain Research Initiative
1/23/2019	UBRI Partnership with THUFR		7679	Ripple Partners With Chinese University for Blockchain Research Program
2/7/2019	Additional UBRI Partnerships		7542	Ripple Announces New University Blockchain Research Initiative Partners, Expands to China and Singapore
7/30/2019	UBRI Expansion to Japan		7538	Ripple Expands University Blockchain Research Initiative Program to Japan, Supports 33 University Partners Across 14 Countries
6/10/2020	Joins ISO 20022 Registration Management Group		8309	ISO 20022: Shaping the Future of Cross-Border Payments
6/18/2020	Joins Open Payments Coalition to launch PayString		8306	Why Ripple Supports PayString
8/26/2020	Additional UBRI Partnerships		8303	UBRI Expands To New Global Markets With More Than 35 University Partners
9/30/2020	Commitment to Carbon-Net Zero by 2030		7529	Ripple Leads Sustainability Agenda to Achieve Carbon Neutrality By 2030
11/2/2020	Commitment to Carbon-Net Zero by 2030	✓	7615	Cryptocurrency's carbon footprint is massive and not sustainable

92. I have identified fourteen relevant announcements related to these initiatives, either announcing their launch or some expansion to their program (see Figure 26).⁸⁸ Figure 27 plots the average XRP price path for the week leading up to and following these announcements and compares it with the average BTC

price path. Unlike the direct XRP-related initiatives discussed above, in these cases there appears to be little or no reaction in the XRP markets to these initiatives (if anything, prices are down slightly following these events), and little or no difference between XRP prices and Bitcoin prices in the days immediately surrounding these announcements.

FIGURE 27: AVERAGE NORMALIZED PRICE PATH BEFORE AND AFTER RIPPLE'S OTHER INITIATIVES



Note: Day labels indicate the beginning of the specified day. News Day shaded in gray. News is released at some point between Day 0 and 1.

93. Figure 28 presents the results of my event study and statistical analysis on Ripple's Other Initiatives. Not surprisingly, there is no evidence of any correlation between these initiatives and XRP prices.

⁸⁸ I exclude a November 2, 2020 Newsroom Article which repeats the announcement of the sustainability initiative, Ken Weber, "Cryptocurrency's carbon footprint is massive and not sustainable," Forkast, November 2, 2020, accessed September 29, 2021, <https://forkast.news/cryptocurrency-big-carbon-footprint-not-sustainable-ripple-ken-weber/>.

FIGURE 28: XRP PRICES DO NOT REACT TO RIPPLE’S OTHER INITIATIVES

Model Number	Parametric	Nonparametric
1		
2		
3		
4		
5		
6		
7		
8		
9	NO SIGNIFICANT RESULTS	
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Notes:

✓

Indicates significance at the 5% level.

Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

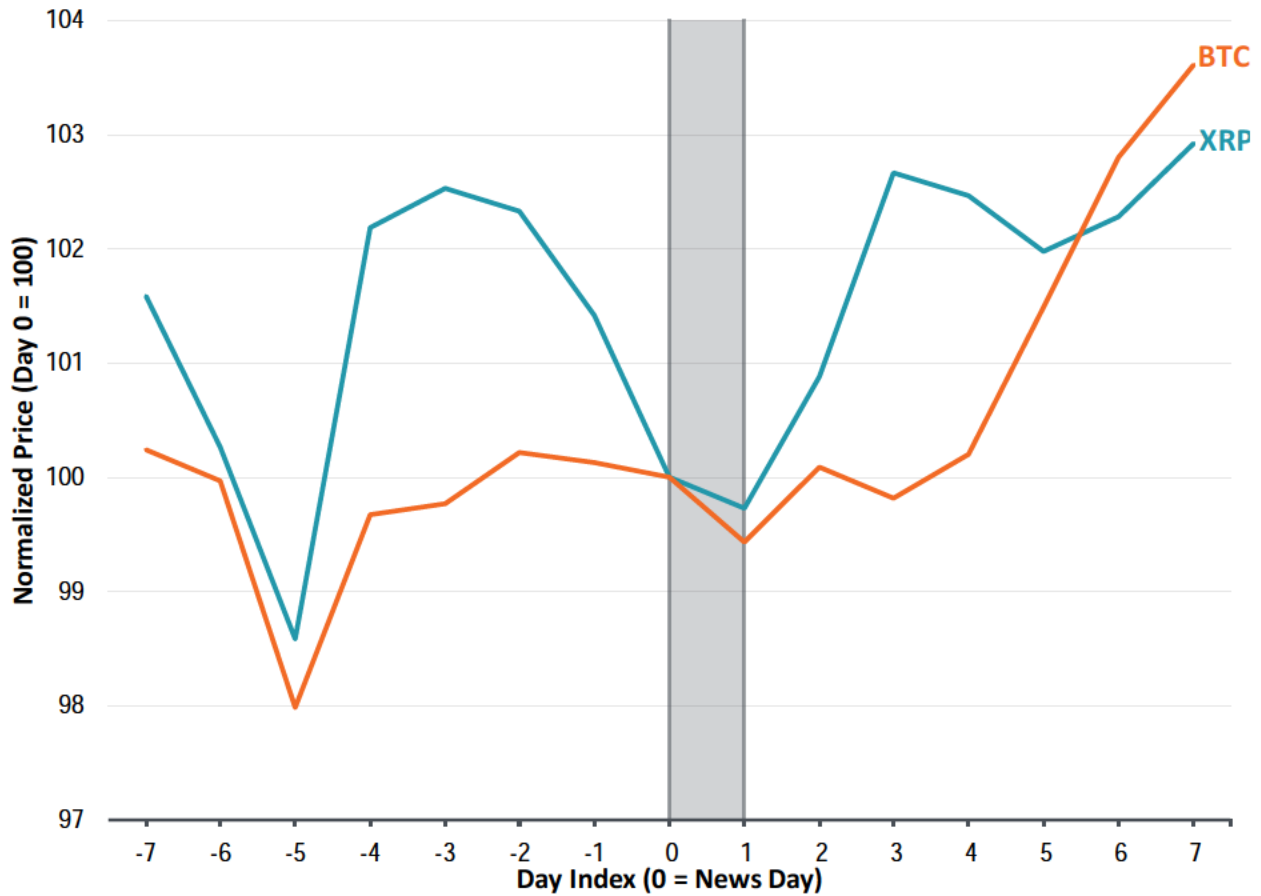
94. The evidence suggests that the XRP market is more responsive to Ripple’s Commercialization Initiatives than it is to its other initiatives.

E. XRP Prices Did Not React to Office and Staff Announcements

95. I have identified 28 relevant announcements related to staff or office expansions.⁸⁹ Figure 29 plots the average XRP price path for the week leading up to and following these announcements and compares it with the average BTC price path. The series appear very similar, and XRP prices do not appear to react to such announcements.

⁸⁹ I exclude a March 17, 2018 Newsroom Article which repeats the March 8 announcement that Cory Johnson was joining Ripple as its chief market strategist. See Ari Levy, "Ripple hires Bloomberg TV's Cory Johnson as chief marketing strategist," CNBC, March 8, 2018, accessed September 29, 2021, https://www.cnbc.com/2018/03/08/ripple-hires-bloomberg-tvs-cory-johnson-as-chief-market-strategist.html?_source=twitter%7Cmain; see also, Daniel Roberts, "Ripple's new chief market strategist: Crypto regulation will 'separate the wheat from the chaff'," Yahoo! Finance, March 17, 2018, accessed September 29, 2021, <https://finance.yahoo.com/news/ripples-new-chief-market-strategist-crypto-regulation-will-separate-wheat-chaff-114110796.html>.

FIGURE 29: AVERAGE NORMALIZED PRICE BEFORE AND AFTER OFFICE AND STAFF ANNOUNCEMENTS



Note: Day labels indicate the beginning of the specified day. News Day shaded in gray. News is released at some point between Day 0 and 1.

96. This observation is confirmed statistically. Figure 30 presents the results of my event study and statistical analysis on Office and Staff Announcements. Not a single test indicates a statistically significant correlation between these announcements and XRP prices.⁹⁰

⁹⁰ I note that this result does not preclude the possibility that "management quality" is of general interest to investors in Ripple Labs or, possibly, to holders of XRP tokens.

FIGURE 30: XRP PRICES DO NOT REACT TO OFFICE AND STAFF ANNOUNCEMENTS

Model Number	Parametric	Nonparametric
1		
2		
3		
4		
5		
6		
7		
8	NO SIGNIFICANT RESULTS	
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Notes:

✓

Indicates significance at the 5% level.

Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

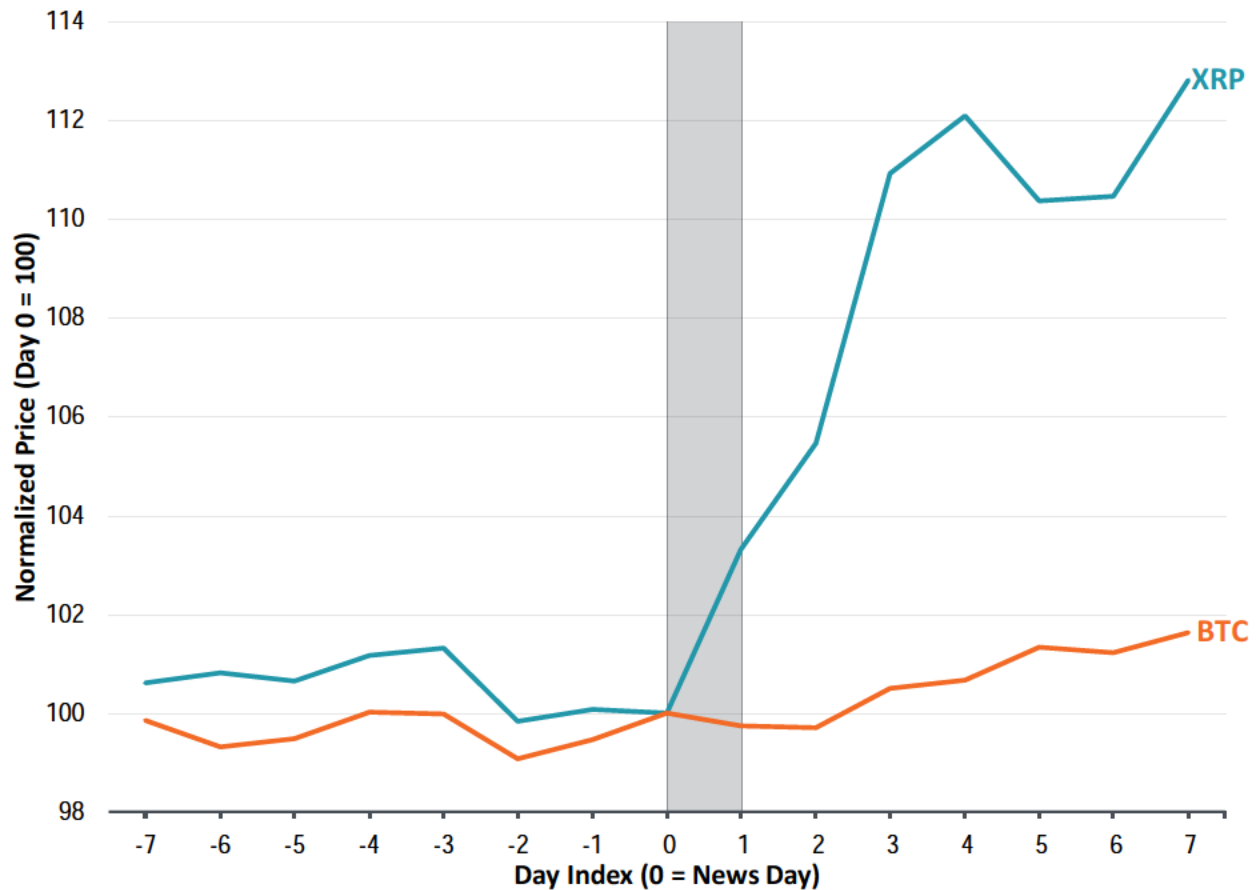
97. In summary, XRP price increases are significantly correlated with key milestones for Ripple Labs, with news of new trading platform listings, with customer and product announcements, and with major initiatives from Ripple Labs including those designed to generate proposed XRP use cases. They do not appear to react to more mundane office and staff announcements or to Ripple’s other initiatives not directly tied to Ripple’s Commercialization Initiatives.

F. Days with Ripple News Are Associated with Significant Abnormal XRP Returns and the Association Is Unlikely to Be Explained by Random Chance

98. As a final analysis I combine all the following categories: Milestones, Trading Platform Listings, Customer & Product, Acquisitions & Investments, and the Ripple Commercialization Initiatives described above in Section VI.D.⁹¹ By combining these events, how I categorize among them becomes irrelevant. It will not matter if a particular event is thought of as a “Milestone” or as a “Customer & Product” announcement. Together these comprise 113 unique, relevant events on 105 unique days.
99. Figure 31 plots the average XRP price path for the week leading up to and the week following these announcements and compares it with the average BTC price path. XRP prices (and Bitcoin prices) appear essentially flat for the week leading up to these events. But while Bitcoin prices remain nearly flat, XRP prices increase sharply, jumping 3% on the day of the announcement and ending about 13% higher one week later.

⁹¹ I had not previously presented the Acquisitions & Investments category. I find 11 Acquisitions & Investments events in my data, listed in Appendix C. I mark one event, the completion of Ripple’s investment in MoneyGram on November 25, 2019, as stale, since this investment had been previously announced on June 17, 2019 (see Daniel Phillips, “Ripple Completes \$50 million investment in MoneyGram,” Decrypt, November 25, 2019, accessed 10/3/2021, <https://decrypt.co/12038/ripple-completes-50-million-investment-in-moneygram> and Paul Vigna, “Ripple to Invest up to \$50 Million in MoneyGram,” Wall Street Journal, June 17, 2019, accessed 10/3/2021, <https://www.wsj.com/articles/ripple-to-invest-up-to-50-million-in-moneygram-11560803556>). I do not find a statistically significant relationship with this category in isolation. See Appendix E.

FIGURE 31: AVERAGE NORMALIZED PRICE BEFORE AND AFTER MILESTONES, TRADING PLATFORM LISTINGS, CUSTOMER & PRODUCT ANNOUNCEMENTS, ACQUISITIONS & INVESTMENTS, AND RIPPLE COMMERCIALIZATION INITIATIVES



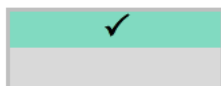
Note: Day labels indicate the beginning of the specified day. News Day shaded in gray. News is released at some point between Day 0 and 1.

100. These 105 event days span 2,369 trading days. Again using the Constant Mean Return Model as an example, it flags 199 days as significantly positive, or 8.4%. Drawing 105 days at random, the single most likely outcome is to draw eight significant market days. Instead, in my sample of 105 event days there are 24 market days. The odds of there being 24 or more market days by random chance are about 1 in 360,000. Recall that the typical standard for scientific research is 1 in 20.
101. Figure 32 presents the results of my event study and statistical analysis on all milestones, trading platform listings, customer & product announcements, acquisitions & investments, and Ripple commercialization initiatives. Every case of every model indicates a statistically significant correlation between these Ripple actions and XRP prices.

FIGURE 32: XRP PRICES REACT TO MILESTONES, TRADING PLATFORM LISTINGS, CUSTOMER & PRODUCT ANNOUNCEMENTS, ACQUISITIONS & INVESTMENTS, AND RIPPLE COMMERCIALIZATION INITIATIVES

Model Number	Parametric	Nonparametric
1	✓	✓
2	✓	✓
3	✓	✓
4	✓	✓
5	✓	✓
6	✓	✓
7	✓	✓
8	✓	✓
9	✓	✓
10	✓	✓
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16	✓	✓
17	✓	✓
18	✓	✓
19	✓	✓
20	✓	✓

Notes:



Indicates significance at the 5% level.

Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

102. The hypothesis that XRP prices are independent of Ripple's news about its business and activities can be rejected at any reasonable significance level. As a further demonstration of this, I apply the generalized rank test also found in Joo, Nishikawa, and Dandapani (2020). This is a test of the joint significance of these 105 event days: is the XRP return of this group events, taken together, statistically significant? Figure 33 indicates the statistical significance of these results. Every model indicates a significant reaction in the XRP market at the 5% level.

FIGURE 33: SIGNIFICANCE OF GENERALIZED RANK TEST APPLIED TO MILESTONES, TRADING PLATFORM LISTINGS, CUSTOMER & PRODUCT ANNOUNCEMENTS, ACQUISITIONS & INVESTMENTS, AND RIPPLE COMMERCIALIZATION INITIATIVES

Model Number	Minimum T-Statistic	Maximum T-Statistic
1	✓	✓
2	✓	✓
3	✓	✓
4	✓	✓
5	✓	✓
6	✓	✓
7	✓	✓
8	✓	✓
9	✓	✓
10	✓	✓
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16	✓	✓
17	✓	✓
18	✓	✓
19	✓	✓
20	✓	✓

Notes:

✓	Indicates significance at the 5% level.
	Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. See Appendix E.

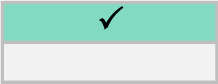
1. There Is No Relationship between Ripple News and Negative XRP Returns

103. As my first robustness check, I investigate whether the Ripple events described above are significantly associated with negative XRP returns. Such an association could be construed as evidence against the proposition in question.
104. Figure 34 reports instances of statistically significant correlations between these news events and XRP price *decreases*. Not a single instance indicates a significant correlation with negative returns.

FIGURE 34: THERE IS NO SIGNIFICANT RELATIONSHIP BETWEEN NEGATIVE XRP RETURNS AND MILESTONES, TRADING PLATFORM LISTINGS, CUSTOMER & PRODUCT ANNOUNCEMENTS, ACQUISITIONS & INVESTMENTS, AND RIPPLE COMMERCIALIZATION INITIATIVES

Model Number	Parametric	Nonparametric
1		
2		
3		
4		
5		
6		
7		
8	NO SIGNIFICANT RESULTS	
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Notes:



Indicates significance at the 5% level.

Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly negative returns are identified at the 5% one-sided level. See Appendix E.

2. There Is No Relationship between Ripple News and XRP Returns Just before the News Is Released

105. I next investigate whether Ripple news events are announced or released during periods of time when XRP prices are simply increasing for “other reasons.” I apply my analytical framework not to the news

day itself, but to three days before the news day. If I continue to find evidence of significant correlation between XRP prices days before the news, this would suggest that something else, something other than the news itself, is driving the price growth. To associate the price increases with the news, and setting aside the possibility of rumors and leakage, I should not find any correlation if I look “too early.”

106. Figure 35 reports incidents of statistically significant correlations between these news announcements and XRP prices three days before the news is released. Not a single instance indicates a significant correlation at the 5% significance level.

FIGURE 35: THERE IS NO SIGNIFICANT RELATIONSHIP BETWEEN XRP RETURNS AND MILESTONES, TRADING PLATFORM LISTINGS, CUSTOMER & PRODUCT ANNOUNCEMENTS, ACQUISITIONS & INVESTMENTS, AND RIPPLE COMMERCIALIZATION INITIATIVES 3 DAYS BEFORE EVENT

Model Number	Parametric	Nonparametric
1		
2		
3		
4		
5		
6		
7		
8	NO SIGNIFICANT RESULTS	
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Notes:

✓	Indicates significance at the 5% level.
	Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

3. Results Are Robust to Misclassifying Events

107. Classifying news is necessarily a subjective exercise. As a final robustness check, I consider the possibility that I may have misclassified events. There are two types of misclassification errors. First, I may have incorrectly included events in my set of “important” events which do not belong – meaning,

some of these 113 events should not have been considered. This first type of error is called “over-classification error.” Second, I may have incorrectly excluded events – meaning, some of the 400 or so excluded events should have been included. This second type of error is called “under-classification error.” I investigate both types of error below.

108. First I consider whether some of the events I have included in the set of Milestones, Trading Platform Listings, Customer & Product Announcements, Acquisitions & Investments and Ripple Commercialization Initiatives should be excluded. I randomly select 10% of the events and remove them from the analysis. I do this ten times. Figure 36 reports the average results. All cases of all models continue to indicate a significant correlation with XRP prices at any reasonable level of confidence. This indicates that my results are robust up to at least a 10% over-classification error rate.

FIGURE 36: CORRELATION BETWEEN XRP RETURNS AND MILESTONES, TRADING PLATFORM LISTINGS, CUSTOMER & PRODUCT ANNOUNCEMENTS, ACQUISITIONS & INVESTMENTS, AND RIPPLE COMMERCIALIZATION INITIATIVES IS ROBUST TO A RANDOM EXCLUSION OF EVENTS

Model Number	Parametric	Nonparametric
1	✓	✓
2	✓	✓
3	✓	✓
4	✓	✓
5	✓	✓
6	✓	✓
7	✓	✓
8	✓	✓
9	✓	✓
10	✓	✓
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16	✓	✓
17	✓	✓
18	✓	✓
19	✓	✓
20	✓	✓

Notes:

✓

Indicates significance at the 5% level.

Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

109. Next, I consider whether some of the events I have excluded from this set of events should be included. I randomly select 10% of all excluded events and add them to the analysis. I do this ten times. Figure 37 reports the average results. All cases continue to indicate a significant correlation with XRP prices at the 5% level. My results are robust up to at least a 10% under-classification error rate.

FIGURE 37: CORRELATION BETWEEN XRP RETURNS AND MILESTONES, TRADING PLATFORM LISTINGS, CUSTOMER & PRODUCT ANNOUNCEMENTS, ACQUISITIONS & INVESTMENTS, AND RIPPLE COMMERCIALIZATION INITIATIVES IS ROBUST TO A RANDOM INCLUSION OF EVENTS

Model Number	Parametric	Nonparametric
1	✓	✓
2	✓	✓
3	✓	✓
4	✓	✓
5	✓	✓
6	✓	✓
7	✓	✓
8	✓	✓
9	✓	✓
10	✓	✓
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16	✓	✓
17	✓	✓
18	✓	✓
19	✓	✓
20	✓	✓

Notes:

✓

Indicates significance at the 5% level.

Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

VII. Correlation of XRP Returns with Other Digital Tokens Changes over Time

110. Event studies applied to traditional equity securities usually include controls for the “broad market” as well as the “industry sector” appropriate to the case at hand.⁹² These specifications are supported by a great deal of theoretical research which suggests that there are likely common factors which would be expected to impact equity securities in a broadly similar way, and industry factors which would be expected to impact a subset of equity securities in a broadly similar way. As an example, during the pandemic equities were generally negatively impacted, but “airline” or “hotel” securities as a group might be impacted differently from “pharmaceuticals” as a group.
111. The idea that a particular market price might be affected both by idiosyncratic events as well as broader market drivers is therefore standard in the event study literature. In this section I investigate the relationship between XRP returns and those of other leading digital tokens to determine to what extent there may be common “digital token” factors driving correlated returns.

A. Security Prices Are Often Related to Common Factors

112. Financial economists have proposed a number of methods for modelling prices of securities. One general method is called the factor model,⁹³ where security prices are modelled to be related to the returns of some factors. Typically, these factors are returns of portfolios of other traded securities.⁹⁴ The market model is an example of a one-factor model,⁹⁵ which relates securities returns to the return of the broad market portfolio.
113. Because Bitcoin is by far the largest and most well-known digital token—especially in the earlier periods—financial economists have sometimes used Bitcoin as a proxy for the broader digital token

⁹² A. Craig MacKinlay, “Event Studies in Economics and Finance,” *Journal of Economic Literature* Vol. 35, 1997, pp. 13-39 at p. 18.

⁹³ A. Craig MacKinlay, “Event Studies in Economics and Finance,” *Journal of Economic Literature* Vol. 35, 1997, pp. 13-39 at p. 18.

⁹⁴ A. Craig MacKinlay, “Event Studies in Economics and Finance,” *Journal of Economic Literature* Vol. 35, 1997, pp. 13-39 at p. 18.

⁹⁵ A. Craig MacKinlay, “Event Studies in Economics and Finance,” *Journal of Economic Literature* Vol. 35, 1997, pp. 13-39 at p. 18.

market. For example, Liu and Tsyvinski (2021) use Google searches for the word “Bitcoin” to proxy for investor attention of the broader digital token market.⁹⁶

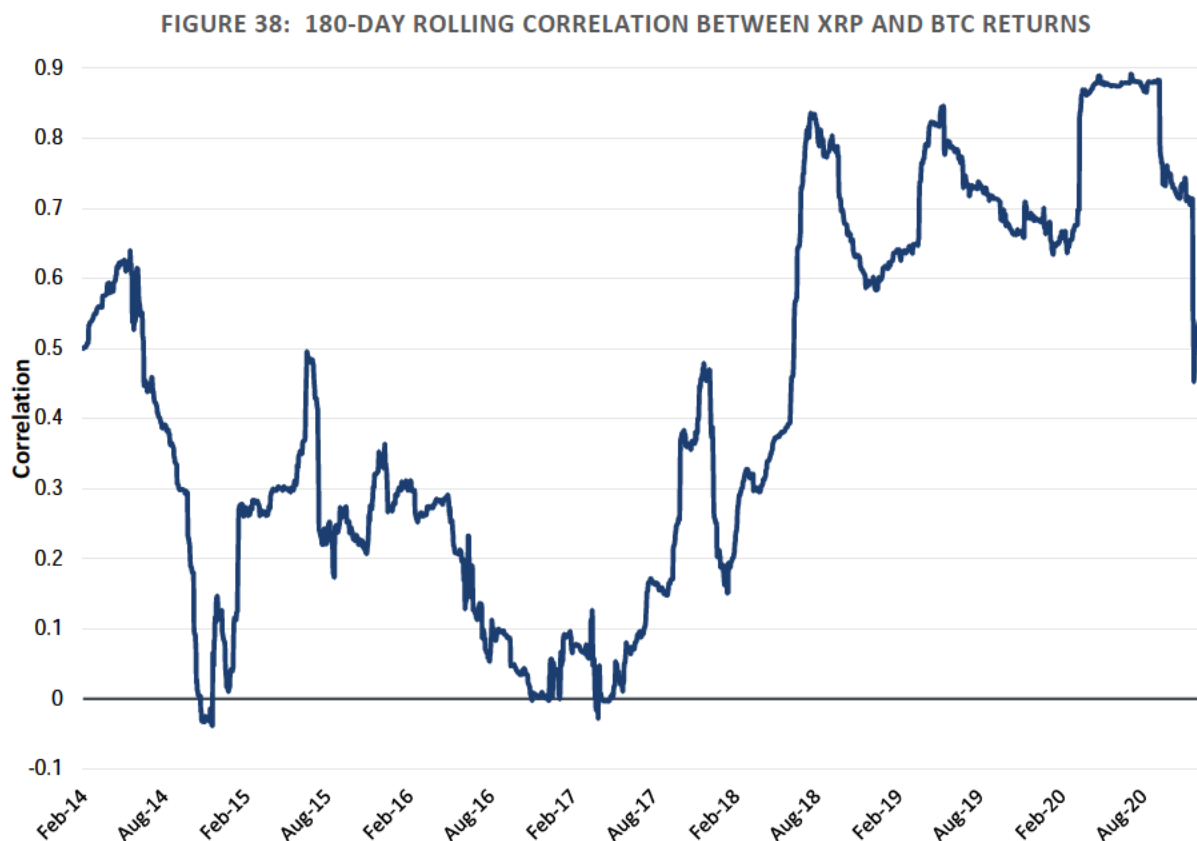
114. Consistent with that, financial economists have found that returns of other digital tokens are correlated with BTC returns.⁹⁷ As discussed below, I also find that during the period from 2014 to the end of 2020, XRP returns are correlated with Bitcoin returns, although the magnitude of that correlation fluctuates over time. More importantly, XRP returns can only be partially explained by BTC returns, and sometimes are explained more by ETH returns.

B. XRP Returns Are Only Partially Explained by Bitcoin Returns, and Sometimes Can Be Better Explained by Ether Returns

115. Figure 38 plots the 180-day rolling correlation between XRP returns and BTC returns. Correlation ranges from -1 to 1; a value of “1” means that two series are perfectly correlated while a value of “0” means they are uncorrelated. In this case, a correlation of “1” would mean that XRP returns and BTC returns move in the same direction in a one-to-one manner: when one increased, the other increased, and vice versa. Knowing the return of one token would immediately tell you the return of the other. A correlation of “-1” would mean that when one increased, the other decreased, and vice versa; again, knowing the return of one would tell you the return of the other (it would just be the opposite). If knowing what happened to one token would not tell you anything about what happened to the other, then the correlation would be “0.” Intermediate correlations are informative but not decisive: a correlation of, say, 50% means that knowing the return of one token gives you some information about the return of the other, but only limited information.
116. Figure 38 illustrates that, except for some short periods of near-zero or even negative correlation, XRP returns and BTC returns are positively correlated, but only partially, with an average value of 0.42. Importantly, Figure 38 illustrates the historical correlation between XRP and BTC returns fluctuates over time and does not have a clear trend or pattern.

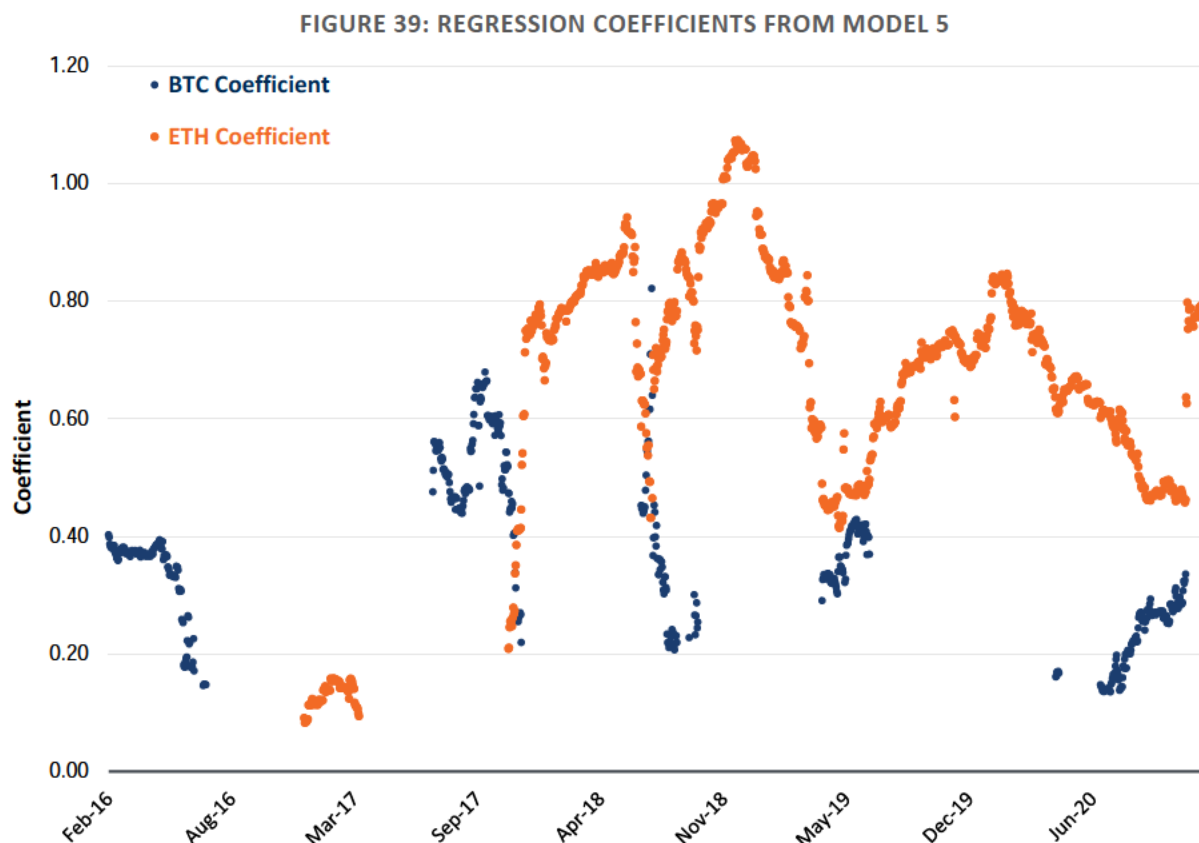
⁹⁶ Yukun Liu and Aleh Tsyvinski, “Risks and Returns of Cryptocurrency,” *The Review of Financial Studies* Vol. 34, 2021, pp. 2689-2727 at pp. 2707-2708.

⁹⁷ See, e.g., Albert S. Hu, Christine A. Parlour, and Uday Rajan, “Cryptocurrencies: Stylized Facts on a New Investible Instrument,” *Financial Management* Vol. 48, 2019, pp. 1049-1068 at Abstract.



Source: CoinMarketCap.

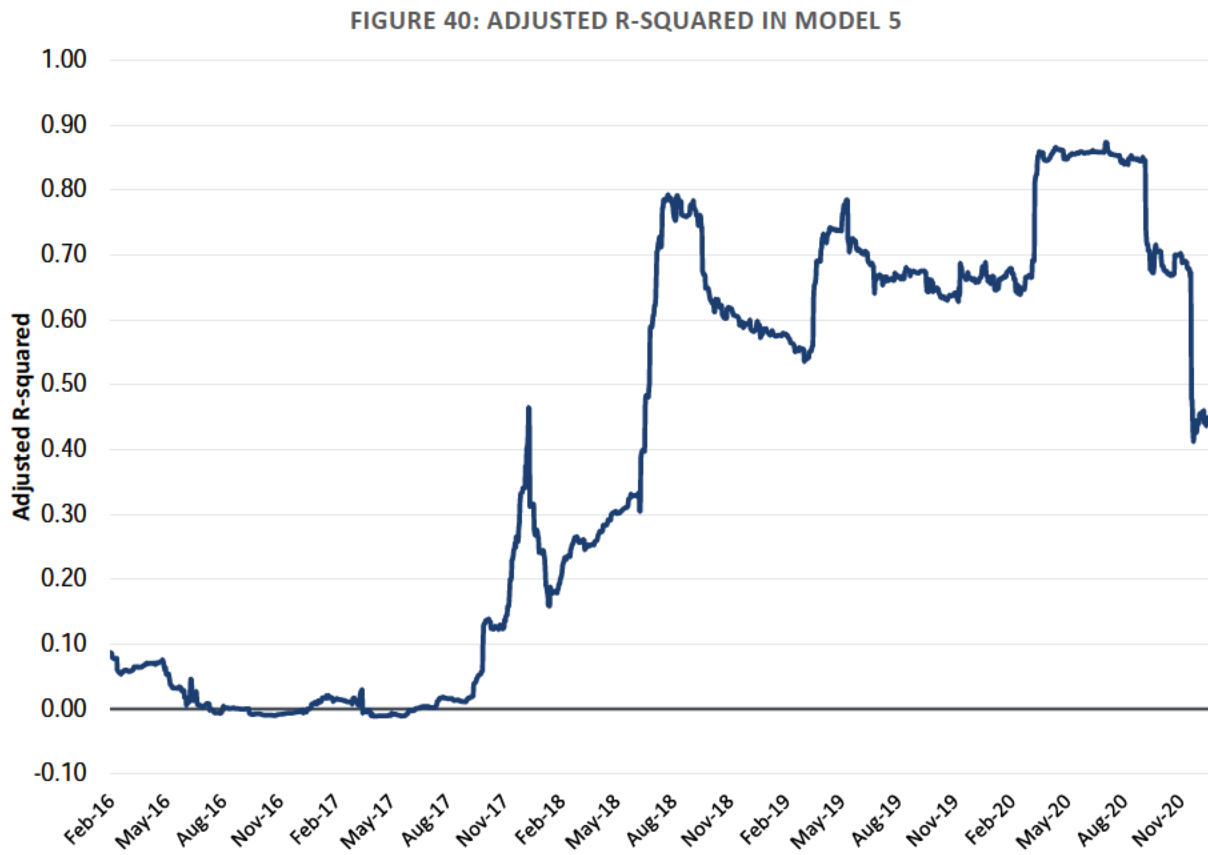
117. As discussed in Section V.B, I implement 20 regression models for XRP returns, each controlling for different sets of explanatory variables that could explain returns of XRP. Most of the models control for BTC; Model 5, in particular, controls for both BTC returns and ETH returns. Results from this model indicate that XRP returns are often explained more by ETH returns than by BTC returns. In addition, the relationship among returns of XRP, BTC, and ETH fluctuates over time.
118. Figure 39 plots the coefficients on BTC returns (dark blue) and the coefficients on ETH returns (orange) from 180-day rolling regressions. Only coefficients that are significant at least at the 10% level are plotted; gaps in Figure 39 therefore correspond to days when those coefficients do not achieve at least that level of significance. When ETH returns are not statistically related to XRP returns, there is a gap in the orange dots; when BTC returns are not statistically related to XRP returns, there is a gap in the dark blue dots.



Source: CoinMarketCap.

119. As illustrated in Figure 39, for both ETH and BTC there are times when they have no statistically significant relationship with XRP returns (i.e., there are gaps in the chart). More recently, ETH returns have "crowded out" BTC returns: there are more gaps in the dark blue dots than in the orange dots. This means, in more recent periods, ETH returns can explain XRP returns more than BTC returns can.
120. Figure 39 also illustrates that the magnitude of the relationships—measured by the coefficients—between XRP returns and ETH returns and the relationship between XRP returns and BTC returns fluctuate over time. A coefficient of 1 on ETH returns means that a 1% change in ETH's price is expected to be associated with a 1% change in XRP's price. Figure 39 illustrates that the coefficient on ETH returns ranges from about 0.10 to above 1.00, whereas the coefficient on BTC returns ranges from about 0.10 to about 0.70.
121. Consistent with the fluctuating pattern illustrated in Figure 39, when taken together, ETH returns and BTC returns can explain XRP returns in varying degrees over time. The adjusted R-squared of Model 5, plotted in Figure 40, illustrates this point. The R-squared measures how well a given set of control variables can explain the independent variable. An R-squared of 1 means that the control variables, taken together, can explain 100% of the variation in XRP returns. As illustrated in Figure 40, while BTC and ETH returns can explain as much as almost 90% of XRP returns during Q2 and Q3 of 2020, they

provide little explanatory power for XRP returns before late 2017. On average, these two factors explain only about 40% of the variation in XRP returns.⁹⁸



Source: CoinMarketCap.

⁹⁸ 40% calculated as the average of the adjusted R-squared series plotted in Figure 40.

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[REDACTED]
[REDACTED] Dr. Metz worked for 15 years at [REDACTED] specializing in corporate, financial institution, sovereign and structured finance credit research and analysis. Most recently he was [REDACTED], a group of nearly 100 professionals with responsibility for developing credit models and methodologies for all asset classes across all lines of business. Dr. [REDACTED] also worked to create the [REDACTED], a team dedicated to leveraging machine learning and data mining techniques. Prior to that Dr. Metz was the [REDACTED], including Default Research, Model Development and Verification, and Technology. Dr. [REDACTED] frequently met with regulators and policy makers to discuss credit risk, credit ratings performance, risk modeling, and anti-trust and other policy questions.

Dr. [REDACTED] main areas of specialization are econometrics and statistics, finance, institutional and consumer credit, real estate, risk modeling and assessment, and numerical methods. He is the author of copyrighted and patented models. In addition to credit risk, his experience also includes work in asset pricing, real estate, and government. His work has been featured in the media such as the *Wall Street Journal*, *The Financial Times*, *The Economist*, *CNNMoney*, *CNBC*, *Forbes*, *Bloomberg*, *Fox Business*, *BusinessWeek*, *Washington Post*, *Huffington Post*, and *Reuters*, among others.

Since becoming a consultant in 2018, Dr. [REDACTED] has testified as an expert witness on behalf of the U.S. Securities and Exchange Commission on event studies and market efficiency. He has worked as the case manager for the U.S. Department of Justice on behalf of [REDACTED] to assist in establishing liability and estimating damages in a case involving fraudulent mortgage servicing practices. Much of his work has been on collusion and manipulation of various markets, including commodities and fixed income securities such as corporate bonds, agency securities, sovereign and supranational bonds, variable rate demand obligations and other debt derivatives.

Dr. [REDACTED] has also worked on behalf of defendants on issues of class certification in the health insurance market. He has also worked on mergers and acquisitions in the telecommunications industry. Dr. [REDACTED] has worked extensively on cases involving multi-sided platforms for private plaintiffs, defendants and the U.S. government.

Dr. [REDACTED] has developed several models of corporate and consumer credit, financial risk contagion, real estate market performance measures, and pharmaceutical drug development, to name a few. He has developed patented models of default and credit rating transitions and trademarked models of regional real estate prices. Dr. [REDACTED] has developed models of residential mortgage default, prepayment and loss which have been used to assess the credit risk of hundreds of billions of dollars in securitizations. He has contributed to books on emerging markets and sovereign risk.

[REDACTED]

In pharmaceuticals, he co-developed a model to estimate the likelihood of drugs failing and succeeding each of the clinical stages of the Food and Drug Administration, and their expected durations in each of these phases. This model has become one of the two most used by industry analysts to assist in valuing pharmaceutical and biotechnology pipelines. His research on pharmaceuticals has been discussed in books on how to value pharmaceutical and biotechnology companies, and on publications pertaining to health care, intellectual property and cartels.

Dr. [REDACTED] has been at the forefront of the empirical detection of some conspiracies and manipulations. In 2008 he flagged the possibility of collusion in LIBOR prior to the launch of large scale investigations. He has also flagged the possibility of manipulation and collusion in gold markets in 2013.

Dr. [REDACTED] has co-authored several articles and papers on econometric methods and screens for conspiracies, manipulations and fraud. He has published in peer-reviewed journals such as the Journal of Pharmaceutical Finance, Economics and Policy, and the Journal of Banking and Finance. His work has also appeared in trade publications including The Antitrust Source, and The Competition Policy International Antitrust Chronicle.

Dr. Metz holds a PhD and a Masters in Economics from [REDACTED] where he was awarded Distinction in the field of Econometrics. He also holds a Bachelor of Arts in Economics from Occidental College where he graduated summa cum laude.

PROFESSIONAL EXPERIENCE

[REDACTED] (New York)

2020–Present

Senior Consultant

- Credit Risk
- Securities fraud and manipulation
- Multi-sided platforms
- Mergers and acquisitions
- Event studies
- Valuation
- Collusion

[REDACTED] (New York)

2018–2020

Managing Director. Consulting experience includes:

- Class certification
- Multi-sided platforms
- Mergers and acquisitions
- Event studies
- Securities fraud

- Valuation
- Collusion
- Market Manipulation

[REDACTED] (New York) 2003–2018
 Managing Director of the [REDACTED], managing a team of about 100 analysts. Research and technical responsibilities included:

- Development of credit rating methodologies and models for all produce lines, including corporate, financial institutions, sovereign, sub-sovereign, municipal and structured finance
- Default and ratings performance research for all product lines, including corporate, financial institutions, sovereign, sub-sovereign, municipal and structured finance
- Model verification and version control
- Regulatory reporting

Managing Director of [REDACTED], a group of 40 analysts. Research and technical responsibilities included:

- Default and ratings performance research for all product lines, including corporate, financial institutions, sovereign, sub-sovereign, municipal and structured finance
- Rating methodology and credit model development
- Rating methodology and credit model validation
- Model verification and version control
- Regulatory reporting

Research Economist, [REDACTED], as Vice President and Senior Vice President

- Published research primarily on corporate default and ratings performance
- Represented [REDACTED] at industry conferences
- Built a patented default and rating transition model
- Built a credit rating predictor model
- Select modeling and methodology development projects include:
 - US Residential Mortgages: lead developer of mortgage default and loss severity models using data for nearly 1.4 million private label mortgages. These models represent the core of [REDACTED] new US residential methodology. The models provide the monthly term structure of default and prepayment risks as well as the first and second moments of the borrower's loss-given-default distribution. Easily permits stressing a portfolio of mortgage exposures based on macroeconomic scenarios.
 - Global Bank Stress Testing: lead the effort to develop a new, consistent framework for stress-testing the asset portfolio of banks globally. A reduced form approach, it applies stress multiples to expected losses of different asset classes.
 - Global Bank Credit Scorecard: developed an innovative credit scorecard for the Baseline Credit Assessments of global banks. The scorecard is based on a regression analysis of

bank failures during the recent financial crisis and incorporates bank balance sheet information, macroeconomic variables and assessments of sovereign credit risk.

- Corporate Defaults: lead developer of the patented Credit Transition Model, [REDACTED] propriety model of corporate (financial and non-financial) credit rating transitions and default. The model forecasts all rating transitions, including upgrades, downgrades, default and withdrawal at the individual issuer level by conditioning on issuer-specific information and macroeconomic drivers. Easily permits a coherent stress-test of corporate exposures based on macroeconomic scenarios. These scenarios could consider not just default, but transitions across rating boundaries (such as falling from investment-grade into speculative-grade) which may be critical to a portfolio manager.
- Credit Rating Prediction: lead developer of [REDACTED] proprietary Rating Predictor Model which maps credit ratios to implied credit ratings. The model significantly outperforms standard approaches such as linear regression and ordered Probit models. The model allows counter-factual analysis to determine how credit ratings might change given changes in underlying balance sheet metrics.

[REDACTED] (Washington, DC)

2002–2003

Principal Analyst in the Microeconomics and Finance Division. Research and policy projected included:

- Econometric Modeling:
 - Developed a model to forecast bank deposits, assessable and insured, for use by the Budget Analysis Division
 - Estimated a discrete time, multiple-destination mixed proportional hazards model of pharmaceutical development
 - Estimated Logistic regressions of first stages of the FHA loss mitigation program
 - Specified a two-stage Probit model of additional stages of FHA loss mitigation program to correct for endogenous selection
- Financial Analysis:
 - Used derivative pricing theory to estimate the market value of risk born by the government through various contingent programs

[REDACTED] (Chicago)

1998–2002

Chief Economist of the real estate investment company. Research projects included:

- Commercial Property Rent and Occupancy: developed proprietary forecasting models of rent and occupancy levels for multifamily, office, retail and warehouse properties at the MSA level.

- Optimal Property Location: developed location models for the Assisted Living and Self-Storage sectors in the U.S. and Europe. The models informed asset acquisition/disposition decisions.

EDUCATION

[REDACTED]

PhD, Department of Economics (2002)

Primary Fields: Econometrics, Macroeconomics and Monetary Economics, Numerical Methods

Secondary Fields: Asset Pricing, Public Finance

Awards: Award of Distinction in Econometrics, 2000

First Ever Student Awarded this Distinction in the Economics Department

MA, Economics (1997)

[REDACTED]

BA, Economics (1994)

Awards: Summa cum laude / Phi Beta Kappa junior year / College Honors
Senior Comprehensive Distinction / *Wall Street Journal* Award for excellence in economics

EXPERT TESTIMONY

[REDACTED]

United States District Court, Southern District of New York

[REDACTED]

- Report Filed [REDACTED]
- Rebuttal Report Filed [REDACTED]
- Deposition Testimony [REDACTED]
- Declaration Filed [REDACTED]

SELECTED PUBLICATIONS, WORKING PAPERS, AND PRESENTATIONS

- [REDACTED] with [REDACTED] book chapter included in "[REDACTED]" published by [REDACTED] 2021 (forthcoming)
- [REDACTED] with [REDACTED] (forthcoming)

[REDACTED]

- [REDACTED] with [REDACTED] Working Paper, June 2021
- [REDACTED] with [REDACTED] Working Paper, June 2021
- [REDACTED] Working Paper, June 2021
- [REDACTED] with [REDACTED] November 2020
- [REDACTED] August 2020
- [REDACTED] November 2019
- [REDACTED] with [REDACTED], January 2019
- [REDACTED] with [REDACTED] July 2018
- [REDACTED] with [REDACTED], December 18, 2014
- Contributed book chapter to [REDACTED] edited by [REDACTED] December 2014
- [REDACTED] Special Comment, July 2014
- [REDACTED] Special Comment, July 2014
- [REDACTED] with [REDACTED] Working Paper, October 2014
- [REDACTED] with [REDACTED] Working Paper, February 2014
 - Assisted in triggering litigation and investigations worldwide
 - Extensively discussed in the media including Bloomberg, Reuters, Wall Street Journal, The Economist, The Financial Times, Kitco
- [REDACTED] NBER 2014
- [REDACTED] NBER 2013
- [REDACTED] presentation to the [REDACTED] NYSSA, 2012
- [REDACTED] with [REDACTED] March (1) 2012
 - Discussed in U.S. Senate Hearings on [REDACTED] November 2013
 - Discussed in Litigation on USD LIBOR by both Plaintiffs and Defendants

- [REDACTED]
[REDACTED] with [REDACTED], Working Paper 2011
- [REDACTED] Working Paper 2011
- [REDACTED] with [REDACTED]
[REDACTED] 36, 136-150, 2012
 - [REDACTED] 2012
 - [REDACTED]
 - Featured in the WSJ, "[REDACTED]," published March 18, 2011
 - Featured in the FT, "[REDACTED]" published March 25, 2011
 - Featured in The Economist, [REDACTED]
A scandal over key interest rates is about to go global," The Economist, July 7, 2012, [REDACTED]
 - Featured in BBC Radio on [REDACTED], aired January 17, 2013
 - Featured in *Sky News TV*, UK, on [REDACTED]
[REDACTED] The Boulton and Co Today TV Show, February 6, 2013
 - Featured in Testimony in the UK Parliament on LIBOR
- [REDACTED] with [REDACTED]
Working Paper, 2010
- [REDACTED] with [REDACTED]
[REDACTED] Working Paper, April 2008
- [REDACTED] available at SSRN, June 2007
- [REDACTED] available at SSRN, August 2007
- [REDACTED] with [REDACTED]
[REDACTED]
(2006), 19-42
 - Presented at the [REDACTED] in Boston in March 2003
 - Presented at [REDACTED] in Chicago in June 2003
 - Discussed in books on health care and on how to value pharmaceutical and biotech R&D pipelines
- [REDACTED]
2005
- [REDACTED]

- Presented at [REDACTED] in Copenhagen, Denmark, *May 2007*
- Presented at [REDACTED] in Venice, Italy, *September 2007*
- Presented at [REDACTED] in Chicago, *October 2008*
- [REDACTED] with [REDACTED] 2004
- *The Role of Risk-Mitigation Strategies in Community Development: A Case Study of the FHA Lease Mitigation Program*, with Charles A. Capone, Jr.
 - Presented at the [REDACTED] in March 2003
- [REDACTED] 2003-6
- [REDACTED]
- PhD Dissertation in Economics, [REDACTED]
- Presented at the [REDACTED] in [REDACTED]

PATENTED AND TRADEMARKED WORK

- [REDACTED]
- [REDACTED]

SELECTED INTERVIEWS AND OTHER MEDIA COVERAGE

- I [REDACTED]
- I [REDACTED]
- I [REDACTED]
- I [REDACTED]
- I [REDACTED]
- I [REDACTED]
- I [REDACTED]

11/11/2016

Documents Relied Upon

	Legal Pleadings	Date
[1]	Complaint, Securities and Exchange Commission v. Ripple Labs, Inc., Bradley Garlinghouse, and Christian A. Larsen, 20 Civ. 10832	December 22, 2020
	Depositions and Exhibits	Date
[2]	Breanne Madigan	May 18, 2021
[3]	David Schwartz	May 26, 2021
[4]	Dinuka Samarasinghe	June 9, 2021
[5]	Monica Long	June 17, 2021
[6]	Asheesh Birla	June 23, 2021
[7]	Miguel Vias	June 28, 2021
[8]	Patrick Griffin	June 29, 2021
[9]	Ryan Zagone	July 20, 2021
[10]	Phillip Rapoport	July 22, 2021
[11]	William Hinman	July 27, 2021
[12]	Ron Will	July 30, 2021
[13]	Lawrence Angelilli	August 3, 2021
[14]	Antoinette O'Gorman	August 4, 2021
[15]	[REDACTED]	August 11, 2021
[16]	Ethan Beard	August 24, 2021
[17]	Christian Larsen	September 14, 2021
[18]	Bradley Garlinghouse	September 20, 2021
	Produced Documents	
[19]	NY-9875_T_00017816	
[20]	RPLI_SEC 0081034	
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Category	Event Date	Event ID	Document Date	Document ID	Headline
[1]	[2]	[3]	[4]	[5]	[6]
Acquisition & Investment	1/16/2018	287	1/16/2018	7766	Ripple turns investor as execs lead \$25M round for storage and rental startup Omni
	4/11/2018	318	4/11/2018	7555	Ripple Invests \$25M in Blockchain Capital's Latest Fund
	4/11/2018	318	4/11/2018	8409	Ripple Invests \$25 Million to Drive Innovation in Blockchain and Digital Assets
	2/5/2019	402	2/5/2019	7675	Investing in Dharma
	2/5/2019	401	2/5/2019	7676	Former BMG Head Zach Katz Launches Music and Tech Investment Group With Scooter Braun's Ithaca Holdings
	3/12/2019	407	3/12/2019	7674	A Big Bet on Blockchain and Gaming: Ripple and Forte Announce \$100 Million Fund
	6/17/2019	418	6/17/2019	7539	Ripple Announces Strategic Partnership with Money Transfer Giant, MoneyGram
	6/17/2019	418	6/17/2019	7668	Ripple to Invest Up to \$50 Million in MoneyGram
	9/27/2019	426	9/27/2019	7664	Ripple's Xpring Looks to Build XRP DeFi Products With New Acquisition
	9/30/2019	427	9/30/2019	8341	Ripple Continues Acquisition Streak, Expands European Operations to Iceland
	10/14/2019	433	10/14/2019	8337	Our Investment in Bitso
	10/14/2019	433	10/14/2019	7659	Ripple invests in Mexican broker Bitso, targets Brazil and Argentina
	11/25/2019	444	11/25/2019	7653	Ripple completes \$50 million investment in MoneyGram
	10/28/2020	507	10/28/2020	7616	Ripple to Invest in Japan's SBI Subsidiary MoneyTap
Case Study	12/13/2014	28	12/13/2014	7901	Small Bank in Kansas Is a Financial Testing Ground
	6/27/2016	155	6/27/2016	7820	Canada to Germany Ripple bank transfer breakthrough for banking industry
	6/27/2016	155	7/12/2016	7819	Sent in Seconds, Not Days: Canadian Bank Tries Distributed Ledger
	7/15/2016	158	7/15/2016	8521	Watch Real Money Cross Borders in Real Time
	2/1/2017	206	2/1/2017	8479	National Bank of Abu Dhabi: First Middle East Bank to Use Ripple for Cross-Border Payments
	7/10/2017	231	7/10/2017	8460	Results of the Bank of England/Ripple Proof of Concept Published Today
	12/18/2017	262	12/18/2017	8430	Krungsri Collaborates with Petrochemical Company to Expedite Cross-border Payments and Retain Customers
	1/29/2018	293	1/29/2018	7761	In Their Own Words: Real Companies Talk Ripple XRP Pilots
	5/10/2018	328	5/10/2018	7553	Ripple Reports Positive Results From xRapid Pilots
	5/10/2018	328	5/10/2018	8402	First Pilot Results for xRapid
	5/10/2018	328	5/10/2018	7715	Ripple: XRP Pilot Cuts Payment Fees Up to 70%
	5/10/2018	328	5/10/2018	7716	Ripple Reveals Results Of First Pilot Tests Using XRP Cryptocurrency
	6/29/2018	345	6/29/2018	7700	Santander, Ripple Use Blockchain To Settle Global Payments
	10/1/2018	368	10/1/2018	8376	Swell 2018: How Banco Santander Launched a Payment App for Millions
	10/2/2018	370	10/2/2018	8373	TransferGo On Solving for Real-Time Cross-Border Settlement at Swell 2018
	10/18/2018	375	10/18/2018	8370	How Payments Improved InstaReM and BeeTech's Customer Experience
	11/15/2018	385	11/15/2018	8361	Swell 2018: Siam Commercial Bank Seeks a Payments Vendor, Finds a Business Partner in Ripple
	11/21/2018	386	11/21/2018	8360	Swell 2018: How Blockchain Can Learn from eBay, the Original Digital Cross Border Payments Company
	12/10/2018	388	12/10/2018	8358	Coinone Transfer Offers South Korea's First Blockchain-Powered Remittance Service
	11/8/2019	443	11/8/2019	8331	Swell 2019: MoneyGram CEO Says 10% of Transactions Between Mexico and U.S. Use On-Demand Liquidity
	12/12/2019	447	12/12/2019	8330	SendFriend Uses On-Demand Liquidity to Save Customers Up to 80% In Remittance Fees
	1/29/2020	452	1/29/2020	8326	goLance Leverages On-Demand Liquidity to Deliver Faster, Cheaper Payments to Their Global Marketplace of Freelancers
	2/12/2020	454	2/11/2020	8324	Amendments: Ensuring Sensible Evolution of the XRP Ledger
	3/5/2020	459	3/5/2020	8320	Bitso and Ripple Are Delivering Friction-Free Exchange Across Latin America
	3/26/2020	462	3/26/2020	8319	Siam Commercial Bank Drives Innovation and Customer Growth With Help From Ripple
	4/2/2020	464	4/2/2020	7642	Money transfer service Azimo partners with Siam Commercial Bank for faster payments to Thailand
	4/2/2020	464	4/9/2020	8318	Azimo and SCB Runs on Ripple for Instant Payments Into Thailand
	4/29/2020	469	4/29/2020	8315	TPBank Uses RippleNet to Drive Transparent Global Payments Between Vietnam and The World
	5/7/2020	473	5/7/2020	8312	BTC Markets Drives Sustainable Growth of Its Exchange with XRP
	5/27/2020	476	5/27/2020	8311	Tapping the Power of RippleNet Cloud
	6/8/2020	478	6/8/2020	8310	Staying the Course in Remittances and SME Payments
Charity	4/23/2015	61	4/23/2015	8585	RippleWorks Launches to Support Global Entrepreneurs Building Paths out of Poverty
	10/16/2017	246	10/16/2017	8444	Ripple & the Gates Foundation Team Up to Level the Economic Playing Field for the Poor
	12/26/2017	268	12/26/2017	8425	The Season for Giving: Auctioning Off Ripple-Branded Patagonia Jackets for Charity
	3/27/2018	315	3/27/2018	8411	Ripple and Its Executives Proud to Support America's Public Schools with \$29 Million XRP Donation to DonorsChoose.org
	3/27/2018	315	3/28/2018	7727	Bay Area startup donates \$29 million to classrooms all over U.S.

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Charity	3/27/2018	315	3/28/2018	7728	Ripple donates \$29 million after nonprofit's founder 'dared' himself to ask
	3/27/2018	315	3/28/2018	7729	Ripple gives away \$29 million of its cryptocurrency to public schools
	3/27/2018	315	3/28/2018	7730	Cryptocurrency Company's \$29 Million Donation Funds Thousands Of Classroom Projects
	3/27/2018	315	3/29/2018	7724	A \$29 Million Cryptocurrency Donation Just Funded Every Project On DonorsChoose.Org
	3/27/2018	315	3/29/2018	7725	San Francisco based Ripple donates \$29M to schools across country
	3/27/2018	315	3/29/2018	7732	Bonanza for schools as SF crypto king Ripple gives \$29M to DonorsChoose.org
	3/27/2018	315	4/2/2018	7726	Every single teacher on a crowd-funding site just got their wishes fulfilled
	5/23/2018	332	5/23/2018	7713	Ellen DeGeneres Gets Emotional After Ashton Kutcher Surprises Her With \$4 Million Donation to Wildlife Fund
	7/30/2018	350	7/30/2018	8389	Ripple and Raising Malawi Launch Campaign to Sponsor Children in Need
	7/30/2018	350	7/31/2018	7697	Ripple Partners With Madonna to Fundraise for Orphans in Malawi
	9/27/2018	364	9/27/2018	7547	Ripple Announces Ripple for Good, Social Giving Will Top \$100 Million
	9/27/2018	364	9/27/2018	7689	'Ripple for Good': Ripple Commits \$100 Million to Social Giving Program
	3/7/2019	406	3/7/2019	8348	Ripple Partners with Tipping Point to Improve Economics Mobility for Bay Area Workers and Families
	4/16/2020	465	4/16/2020	8317	Giving in Place: Ripple Is Proud to Be Part of the Tech Community's Response to COVID-19
	4/16/2020	465	4/25/2020	7639	Blockchain firm Ripple donates \$5 million to Bay Area food banks
	5/22/2020	475	5/22/2020	7637	Ripple And Chris Larsen Make Waves With Covid-19 Donations In Bay Area
	10/15/2020	503	10/15/2020	8297	Mercy Corps: Leveraging the Potential of Fintech To Accelerate Financial Inclusion in Emerging Markets
	12/20/2020	514	12/20/2020	8292	Our Commitment To Combating Food Scarcity With Eat. Learn. Play.
Corporate Activity & Announcement	6/19/2014	4	6/19/2014	7933	Creating Faster Foundations
	10/20/2014	15	10/20/2014	7593	21 Top Bitcoin and Digital Currency Companies Endorse New Digital Framework for Digital Identity, Trust and Open Data
	10/20/2014	15	10/20/2014	7920	Manifesto Vows to Give Consumers Control of Digital Identities
	10/20/2014	15	10/21/2014	7918	Why 20 Bitcoin Companies Are Backing a New Deal for Digital Identity
	12/24/2014	30	12/24/2014	7899	The 10 Most Influential People in Bitcoin 2014
	2/9/2015	42	2/9/2015	7590	Ripple Labs Named Fourth Most Innovative Company in Money for 2015 by Fast Company
	2/9/2015	42	2/9/2015	8589	Ripple Labs Makes Fast Company's 2015 Most Innovative Companies List
	2/9/2015	42	2/9/2015	7881	The World's Top 10 Most Innovative Companies Of 2015 In Money
	3/30/2015	55	3/30/2015	7871	EBAday attracts titans of transaction banking
	4/30/2015	63	4/30/2015	8583	European Payments Council: Ripple for Inter-bank Payments
	5/1/2015	65	5/1/2015	7861	An infrastructure approach to improving Financial Inclusion
	8/5/2015	90	8/5/2015	7582	Ripple Labs Awarded as Technology Pioneer by World Economic Forum
	8/5/2015	90	8/5/2015	8571	Ripple Labs Named a Technology Pioneer by World Economic Forum
	12/9/2015	110	12/9/2015	7830	The Fintech 50: The Complete List 2015
	12/21/2015	114	12/21/2015	8557	Looking Forward to Davos 2016
	1/16/2016	121	1/16/2016	7648	The 35 Best Small and Medium Workplaces in the Bay Area
	2/2/2016	130	2/2/2016	8545	Join the Interledger Community Meeting
	2/22/2016	133	2/22/2016	8541	Looking Forward to the W3C Interledger Payments Community Group Meeting
	3/16/2016	137	3/16/2016	8537	Chris Larsen to Guest Lecture for MIT Future Commerce
	4/15/2016	142	4/15/2016	8534	Looking Forward to NACHA #PAYMENTS2016
	4/26/2016	144	4/26/2016	8532	Nilesh Dusane Recognized as BAFT Future Leader
	7/29/2016	161	7/29/2016	8518	Looking Forward to Sibos 2016
	9/26/2016	175	9/25/2016	8508	Sibos 2016: Ripple Has Arrived
	9/27/2016	176	9/27/2016	8507	Ripple Executive Marcus Treacher Appointed to CHAPS Board
	10/17/2016	183	10/17/2016	8499	Interledger.js Joins the JavaScript Foundation
	1/18/2017	204	1/18/2017	8480	Ryan Zagone Recognized as BAFT Future Leader
	7/21/2017	234	7/21/2017	8456	Federal Reserve Task Force: Ripple Improves Speed and Transparency of Global Payments
	8/24/2017	236	8/24/2017	8454	Announcing Swell by Ripple
	10/15/2017	237	10/15/2017	8445	A Rising Tide of Anticipation Builds for Swell
	2/21/2018	304	2/21/2018	8415	Continued Decentralization & the XRP Ledger Consensus Protocol
	3/2/2018	306	3/2/2018	7556	Ripple Applauds Mexico's Lower House of Congress for Passing FinTech Rules
	3/23/2018	313	3/23/2018	8412	Tour de Schwartz
	4/17/2018	320	4/17/2018	7720	Ripple's Brad Garlinghouse and Michael Arrington to talk cryptocurrency at Disrupt SF

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Corporate Activity & Announcement	4/24/2018	321	4/24/2018	8407	XRP Community Comes Together for Blockchain Week
	5/15/2018	331	5/15/2018	8399	Growing Support for an XRP Symbol
	5/23/2018	333	5/23/2018	8398	Schwartz Rides Again: Tour de Schwartz EU
	7/31/2018	351	7/31/2018	7551	President Bill Clinton Keynotes Ripple's Swell Conference 2018
	7/31/2018	351	7/31/2018	8388	President Bill Clinton Keynotes Swell 2018
	9/7/2018	359	9/7/2018	8385	President Bill and Counting Crows Headline Swell 2018
	9/30/2018	366	9/30/2018	8379	Swell 2018 Kicks Off Tomorrow
	10/3/2018	373	10/3/2018	8372	Swell 2018: Wrapping Up a Historic Year for Ripple
	10/19/2018	376	10/19/2018	8369	Ripple Leadership Front and Center at Money20/20
	12/18/2018	390	12/18/2018	8357	Ask Me Anything with Brad Garlinghouse and Monica Long
	4/8/2019	410	4/8/2019	7672	World Changing Ideas 2019: All the winners, finalists, and honorable mentions
	4/16/2019	412	4/16/2019	7671	Blockchain 50: Billion Dollar Babies
	8/19/2019	422	8/19/2019	8344	A New Reality Unfolds: Announcing Swell 2019 Keynote Speakers
	9/4/2019	423	9/4/2019	7665	Top Startups To Work For In 2019 According To LinkedIn
	9/12/2019	424	9/12/2019	8343	Ambassador Chan Heng Chee to Highlight U.S.-China Politics and Geoeconomics at Swell 2019
	9/25/2019	425	9/25/2019	8342	DBS Group CEO Piyush Gupta to Discuss the Future of Digital Banking at Swell 2019
	10/4/2019	429	10/4/2019	8339	Academia, Take the Wheel: UBRI Enters Its Sophomore Year in High Gear
	10/16/2019	435	10/16/2019	8336	MoneyGram CEO to Highlight the Impact of Digital Assets and Blockchain Technology at Swell 2019
	2/19/2020	456	2/19/2020	7646	Forbes Blockchain 50
	4/28/2020	468	4/28/2020	7631	World Changing Ideas Awards 2020: Experimental Finalists and Honorable Mentions
	5/5/2020	471	5/5/2020	8313	Block Stars: How Digital Assets Will Help Create a Sustainable Global Economy
	5/29/2020	477	5/29/2020	7636	Meet the Most Influential Women in Bay Area Business 2020
	6/16/2020	481	6/16/2020	7635	DISRUPTOR 50 2020. Ripple
	7/29/2020	486	7/29/2020	7629	100 Best Workplaces for Innovators
	7/31/2020	488	7/31/2020	7628	Top Bay Area Corporate Philanthropists
	8/3/2020	490	8/3/2020	7627	Annual Inc5000 2020
	9/15/2020	494	9/15/2020	8302	The World Economic Forum's Sheila Warren Keynotes Ripple Swell Global 2020
	10/22/2020	505	10/22/2020	8295	Creating a More Inclusive Financial System With Crypto
Customer & Product	5/5/2014	1	5/5/2014	7598	Ripple Labs Announces Fidor Bank AG as First Bank to Use the Ripple Protocol
	6/12/2014	2	6/12/2014	7597	AstroPay Launches First Latin American Money Service Business on Ripple Protocol
	6/12/2014	2	6/13/2014	7935	Ripple LatAm Looks To Streamline Remittances and Cross-Border Payments
	7/21/2014	7	7/21/2014	7930	Ripple Labs Unveils Proposal for New Smart Contract System
	7/29/2014	9	7/29/2014	7596	Anyone Can Now Trade, Send and Spend Physical Gold Online via GBI's Ripple Gateway
	7/29/2014	9	7/30/2014	7926	You Can Now Use Ripple to Buy, Spend and Trade Gold
	7/29/2014	9	7/30/2014	7927	The Bitcoin Crowd Reaches Out to the Gold Bugs
	9/24/2014	11	9/24/2014	7594	Hundred-Year-Old CBW Bank One of the First U.S. Banks to Integrate Ripple as Transformational Money Transfer Protocol
	9/24/2014	12	9/24/2014	7595	Cross River Bank to Integrate Ripple for Real-Time International Payments
	9/24/2014	13	9/24/2014	7923	Two US banks are ready to embrace the Ripple protocol, allowing instant global money transfers
	9/24/2014	13	9/24/2014	7924	Ripple Signs First Two U.S. Banks to Bitcoin-Inspired Payments Network
	9/24/2014	13	9/25/2014	7919	US Banks: Why We Embraced Ripple
	9/24/2014	13	9/25/2014	7925	Ripple Brings Real Time Payments To The U.S.
	10/27/2014	17	10/27/2014	7916	Ripple Ecosystem Expands with British Startup Ripula
	11/4/2014	21	11/4/2014	7912	Ripple protocol integrated into risk management system from Yantra
	12/3/2014	26	12/3/2014	7592	Earthport and Ripple Labs Announce Global Partnership to Improve the Efficiency and Speed of Cross-Border Payments
	12/3/2014	26	12/4/2014	7903	BitBeat: Ripple Partners With Global Payments Service Earthport
	12/3/2014	26	12/4/2014	7904	Ripple Labs, Earthport Cut Open Source Deal
	12/3/2014	26	12/4/2014	7905	Earthport and Ripple Bring Crypto Tech to Cross-Border Payments
	12/3/2014	26	12/4/2014	7906	Ripple to plug into Earthport payment network
	12/3/2014	26	12/4/2014	7907	Ripple Labs Partnership Brings Real-Time Transactions to Global Payments Hub
	4/29/2015	62	4/29/2015	8584	Milken Institute: Bringing Financial Inclusion to the Underserved
	4/29/2015	62	4/29/2015	7864	New Moves by Coinbase, Ripple Advance Digital Money Tech

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Customer & Product	4/29/2015	62	4/29/2015	7865	Western Union Will Give Ripple a Chance
	6/9/2015	77	6/9/2015	7853	Westpac, ANZ trial Ripple payments, but big four reluctant on bitcoin
	10/6/2015	97	10/6/2015	7579	New Ripple Settlement and FX Solutions Lower the Total Cost of Settlement for Banks and Their Customers
	10/13/2015	98	10/13/2015	7837	D+H adopts Ripple distributed ledger to reduce costs
	12/16/2015	112	12/16/2015	8558	Distributed Ledger Technology Offers Solutions for Trade Finance in Asia
	1/12/2016	119	1/12/2016	8554	Earthport Launches Distributed Ledger Hub
	4/12/2016	141	4/12/2016	7575	MIT Adopts Ripple Validator to Advance Consensus and Blockchain Research
	4/12/2016	141	4/12/2016	8535	MIT Running a Ripple Validator
	4/19/2016	143	4/19/2016	8533	Introducing CGI's Ripple-Enabled Intelligent Gateway
	5/26/2016	148	5/26/2016	8528	Santander Becomes the First U.K. Bank to Use Ripple for Cross-Border Payments
	5/26/2016	148	5/26/2016	7833	Santander first UK bank to do blockchain-based international payments using Ripple
	6/22/2016	154	6/22/2016	7574	More Financial Institutions Join Ripple's Global Network
	6/22/2016	154	6/22/2016	8523	Seven Leading Banks Join Ripple's Global Network
	6/22/2016	154	6/22/2016	7823	Banks trial Ripple blockchain to make money transfers 'like sending an iMessage'
	6/22/2016	154	6/22/2016	7825	Banks to use cutting-edge blockchain technology to speed up transactions
	6/22/2016	154	6/23/2016	7827	More Banks Are Trying Out Blockchains For Fund Transfers
	6/22/2016	154	7/2/2016	7828	Seven banks kick-off Ripple's blockchain network including Santander, UBS and UniCredit - '90 more in the pipeline'
	6/22/2016	154	6/22/2016	7822	Banks claim blockchain breakthrough in money transfer
	7/18/2016	159	7/18/2016	8520	Mizuho to Pilot Ripple for Cross-Border Payments
	8/16/2016	165	8/16/2016	8514	Multi-Signing in Ripple: A Q&A with David Schwartz
	8/19/2016	169	8/19/2016	8513	SBI Ripple Asia Announces Japanese Bank Consortium
	9/15/2016	171	9/15/2016	7572	Ripple Adds Several New Banks to Global Network
	9/15/2016	171	9/15/2016	8511	Several Globl Banks Join Ripple's Growing Network
	9/28/2016	177	9/28/2016	8506	Sibos Day 2: Standard Chartered and CGI Share News
	9/28/2016	177	9/28/2016	8505	Live from Sibos: Bankers Talk Ripple
	10/20/2016	185	10/20/2016	7570	R3 Trials Interbank Cross-Border Payments With Ripple's Digital Asset XRP
	10/20/2016	185	10/20/2016	8497	Ripple and R3 Team Up with 12 Banks to trial XRP for Cross-Border Payments
	10/20/2016	185	10/20/2016	7806	U.S. start-up R3, banks test Ripple's cross-border payments technology
	10/20/2016	185	10/20/2016	7807	Ripple and R3 Achieve Breakthrough in Cross-Border Bank Payments
	11/16/2016	191	11/16/2016	8492	Ripple Announces An Upgrade to RippleCharts
	12/12/2016	197	12/12/2016	8486	FlashFX Uses Ripple and XRP
	1/9/2017	199	1/9/2017	7801	Axis Bank becomes third lender to offer block chain service
	2/15/2017	209	2/15/2017	8477	BitGo Builds Enterprise Wallet for XRP
	2/28/2017	212	2/28/2017	8474	Ripple Consensus Ledger Can Sustain 1000 Transactions per Second
	3/2/2017	213	3/1/2017	8473	Forty Seven Japanese Banks Move Towards Commercial Phase Using Ripple
	3/2/2017	213	3/1/2017	7797	Ripple takes money transfers to the cloud
	3/7/2017	214	3/7/2017	8472	Ripple Can Help Banks Evaluate Their Cross-Border Payment Costs
	3/17/2017	216	3/17/2017	8470	Ripple Selected to Participate in the Bank of England FinTech Accelerator
	3/31/2017	219	3/31/2017	8468	New Features Increase XRP Ledger Transaction Throughput to Same Level as Visa
	4/26/2017	222	4/26/2017	7568	Ten More Financial Institutions Join Ripple's Global Payments Network
	4/26/2017	222	4/26/2017	8465	Ten New Customers Join Ripple's Global Payment Network
	5/11/2017	224	5/11/2017	8464	How We Are Further Decentralizing the XRP Ledger to Bolster Robustness for Enterprise Use
	6/29/2017	229	6/29/2017	7566	SCB, Ripple Launch First Blockchain-Powered Payment Service Between Japan and Thailand
	6/29/2017	229	6/29/2017	8461	It's Now Faster and Easier to Send Money Between Japan and Thailand
	7/10/2017	230	7/10/2017	8459	Sumitomo Mitsui Banking Corporation and Japan Post Bank Join SBI Ripple Asia's Bank Consortium
	7/17/2017	232	7/17/2017	8458	XRP Ledger Decentralizes Further With Expansion to 55 Validator Nodes
	9/11/2017	241	9/11/2017	8450	SBI Ripple Asia partners with DAYLI Financial Group to bring Ripple to South Korea
	10/10/2017	244	10/10/2017	7565	Ripple's Blockchain Network Is Now More Than 100 Strong
	10/10/2017	244	10/10/2017	8447	RippleNet Grows to More Than 100 Financial Institutions
	11/16/2017	252	11/16/2017	7564	American Express Introduces Blockchain-enabled, Cross-border Payments
	11/16/2017	252	11/16/2017	8438	American Express Joins RippleNet - Giving Visibility and Speed to Global Commercial Payments
	11/22/2017	255	11/22/2017	8436	Ripple-powered Instant Payment Services Now Live with Axis Bank, RAKBANK, and Standard Chartered

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Customer & Product	11/22/2017	255	11/22/2017	7790	Standard Chartered, Axis Launch Payments Service With Ripple Tech
	12/5/2017	258	12/5/2017	8434	Japan Bank Consortium Moves to Become Production-ready
	12/12/2017	261	12/14/2017	8431	Top Korean Banks Work with Japan Banks Consortium to Modernize Cross-border Payments
	1/11/2018	284	1/11/2018	7562	Ripple and MoneyGram Partner to Modernize Payments
	1/11/2018	284	1/11/2018	8422	MoneyGram to Use XRP for Faster International Payments
	1/11/2018	284	1/11/2018	7768	MoneyGram shares jump on partnership with bitcoin rival Ripple
	1/11/2018	284	1/11/2018	7769	MoneyGram Signs Deal to Work With Currency Startup Ripple
	1/11/2018	284	1/11/2018	7770	Ripple surges after news of deal with MoneyGram
	1/11/2018	284	1/14/2018	7767	MoneyGram teams up with cryptocurrency Ripple on 'payment flow' project
	1/24/2018	290	1/24/2018	8420	More Global Payment Providers, IDT and MercuryFX, Sign Up to Use XRP
	1/24/2018	290	1/24/2018	7763	Ripple Adds New Partners in Push to Make Case for XRP
	1/29/2018	292	1/29/2018	7760	MoneyGram CEO Plans Waves With Ripple
	2/7/2018	296	2/7/2018	7561	Ripple Partners with LianLian International to Power Instant Payments to China
	2/7/2018	296	2/7/2018	8418	LianLian International Joins RippleNet to Provide Faster Payments into China
	2/7/2018	296	2/7/2018	7758	Ripple Blockchain Network Adds China Payments Provider
	2/8/2018	297	2/10/2018	7560	UAE Exchange Partners with Ripple for Instant Cross-Border Payments
	2/8/2018	297	2/11/2018	7757	Ripple Signs International Payment Deal with Foreign Exchange Giant UAE Exchange
	2/8/2018	297	2/12/2018	7755	UAE Remittance Firm Partners With DLT Startup Ripple
	2/8/2018	297	2/12/2018	7756	UAE Exchange Partners With Ripple
	2/13/2018	299	2/13/2018	7752	Western Union Says It's Testing Transactions With Ripple
	2/13/2018	299	2/14/2018	7751	Western Union says it's testing transactions using Ripple technology
	2/13/2018	299	2/14/2018	7753	Western Union Is Testing Ripple and XRP for Money Transfers
	2/14/2018	300	2/14/2018	7559	Ripple and Saudi Arabian Monetary Authority (SAMA) Offer Pilot Program for Saudi Banks
	2/14/2018	300	2/14/2018	8417	Ripple and Saudi Arabian Monetary Authority (SAMA) Offer Pilot Program for Saudi Banks
	2/14/2018	300	2/14/2018	7754	Saudi Central Bank to Test Ripple Payments Tech
	2/14/2018	300	2/15/2018	7749	Saudi Arabia's central bank signs blockchain deal with Ripple
	2/21/2018	302	2/21/2018	7558	Ripple Extends its Reach into Emerging Markets With Five New Customers
	2/21/2018	302	2/21/2018	8416	RippleNet Strengthens Emerging Markets Access into India, Brazil and China
	2/21/2018	302	2/21/2018	7745	Ripple Adds 5 New Clients Across 4 Countries
	2/21/2018	302	2/21/2018	7746	Ripple Adds Top Latin America Bank to Its Cash-Transfer Network
	2/21/2018	303	2/21/2018	7747	Ripple Papers Pledge New Start for \$40 Billion XRP
	3/1/2018	305	3/1/2018	7557	FLEETCOR & Ripple Team Up to Modernize Payments Using Blockchain
	3/1/2018	305	3/1/2018	8414	Cambridge to Use XRP for Faster Global Payments
	3/1/2018	305	3/1/2018	7744	Payment Provider Fleetcor to Pilot Ripple's XRP Cryptocurrency
	3/6/2018	308	3/6/2018	8413	Ripple Powered Mobile App to Provide On-Demand Domestic Payments in Japan
	3/6/2018	308	3/7/2018	7739	Japanese Banks to Harness Ripple DLT for Consumer Payments App
	3/6/2018	308	3/7/2018	7741	Ripple Develops Blockchain Payments App With 61 Japanese Banks
	3/6/2018	308	3/7/2018	7742	Ripple develops blockchain-powered payment app with 61 banks to speed up transactions in Japan
	3/24/2018	314	3/24/2018	7734	Santander is set to launch an international money transfer app with Ripple
	4/12/2018	319	4/12/2018	8408	Santander Launches First Mobile App for Global Payments Using Ripple's xCurrent
	4/12/2018	319	4/12/2018	7721	Blockchain dreams do come true: A big Spanish bank's customers can now use it to transfer money
	4/12/2018	319	4/12/2018	7723	Santander launches a blockchain-based foreign exchange service that uses Ripple's technology
	4/12/2018	319	4/12/2018	7722	Santander launches blockchain-based foreign exchange service
	4/26/2018	324	4/26/2018	7554	Ripple Grows Its Global Payments Network With Five New xVia Customers
	4/26/2018	324	4/26/2018	8404	xVia Opens New Doors in Emerging Markets
	5/7/2018	327	5/8/2018	8403	Korea's Coinone Transfer Joins RippleNet
	5/7/2018	327	5/9/2018	7717	Crypto Exchange Coinone Taps Ripple for New Remittance Service
	5/14/2018	329	5/14/2018	8400	Mitsubishi Corporation, Krungsri and Standard Chartered Pilot Payments from Thailand to Singapore on RippleNet
	5/26/2018	335	5/31/2018	7709	Money Transfer Firms Join Ripple's Payment Network
	6/27/2018	344	6/27/2018	8394	Ripple Improves Access to India with Kotah Mahindra Bank
	9/5/2018	358	9/5/2018	7692	TransferGo Opens Payments Corridor to India Using Ripple Tech
	9/13/2018	361	9/13/2018	8384	National Commercial Bank of Saudi Arabia Joins RippleNet

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Customer & Product	9/19/2018	362	9/19/2018	7548	PNC Treasury Management Joins RippleNet
	9/19/2018	362	9/19/2018	8382	PNC Bank Embraces Blockchain and Join RippleNet
	9/19/2018	363	9/19/2018	8383	RippleNet Now Reaches 40 Countries Improving Remittances and SME Payments
	9/19/2018	362	9/19/2018	7690	Blockchain startup Ripple signs up PNC as a customer for its payment tech
	9/28/2018	365	9/28/2018	8380	Siam Commercial Bank Drives Pioneers RippleNet's "Multi-hop" Feature
	10/1/2018	367	10/1/2018	7546	Ripple Highlights Record Year, xRapid Now Commercially Available
	10/1/2018	367	10/1/2018	8378	Ripple Highlights Record Year, xRapid Now Commercially Available
	10/1/2018	367	10/1/2018	7684	Ripple says 3 clients are putting xRapid into full commercial use
	10/1/2018	367	10/1/2018	7685	Ripple is Real, as Global Money Transfers Fueled by XRP Go Live Today
	10/1/2018	367	10/1/2018	7686	Startup Ripple signs up payments firms for crypto-based platform
	10/1/2018	367	10/1/2018	7687	Ripple Debuts XRP-Based Cryptocurrency Product for International Payments
	10/1/2018	367	10/1/2018	7688	Ripple's cryptocurrency product goes live for the first time with three financial firms
	11/14/2018	384	11/14/2018	7545	CIMB Group Joins RippleNet to Power Instant Payments Across ASEAN
	11/14/2018	384	11/14/2018	8362	CIMB Group Joins RippleNet to Power Instant Payments Across ASEAN
	12/13/2018	389	12/13/2018	7682	Finabl's UAE Exchange, Ripple to begin blockchain payments by first quarter
	1/8/2019	392	1/8/2019	8355	RippleNet Surpasses 200 Customers Worldwide
	1/8/2019	394	1/8/2019	7680	Could Ripple's XRP replace correspondent banks? This bank says yes
	1/8/2019	392	1/9/2019	7544	RippleNet Reaches Milestone, Surpasses 200 Customers
	10/9/2019	431	10/9/2019	7537	Ripple to Bring Blockchain Technology to Finastra's Banking Customers
	10/9/2019	431	10/9/2019	8338	Ripple to Bring Blockchain Technology to Finastra's Banking Customers
	10/9/2019	431	10/16/2019	7658	Finastra taps Ripple for real-time payments across borders
	11/6/2019	441	11/6/2019	7535	Ripple Announces More Than 300 Customers, RippleNet Growth
	11/6/2019	441	11/6/2019	8332	RippleNet Growth: Announcing More Than 300 Customers
	11/6/2019	441	11/6/2019	7654	Ripple Surpasses 300 Customers As Swell 2019 Kicks Off In Singapore
	12/10/2019	445	12/10/2019	7651	Xpring Releases New XRP Tools, XRPL 1.4.0 Released
	1/21/2020	450	1/21/2020	8328	How Blockchain and Crypto Meet Growing SME Demand
	2/4/2020	453	2/4/2020	8325	Enabling Faster Cross-Border Payments Between the U.S. and Mexico
	2/25/2020	457	2/25/2020	7534	Ripple on Full-Scale to Tap into South Korean Market
	2/25/2020	457	2/25/2020	8322	Sentbe, Hanpass, WireBarley and More Leverage RippleNet to Improve Remittances in Korea
	2/26/2020	458	2/26/2020	7533	Azimo and Ripple Partner to Deliver Faster, Cheaper Payments to the Philippines
	2/26/2020	458	2/26/2020	8321	Azimo Uses On-Demand Liquidity for Faster International Payments Into the Philippines
	2/26/2020	458	2/26/2020	7645	Ripple claims a big win in the elusive quest to use cryptocurrency in banking
	3/19/2020	460	3/18/2020	7532	DeeMoney Partners with Ripple to Power Faster and Cheaper Cross-Border Money Transfers
	4/27/2020	467	4/27/2020	7531	SCB Partners with Ripple Extending SCB Global Payment Strategy
	6/15/2020	480	6/15/2020	7530	RippleNet Cloud Reaches New Milestone, Signs First Bank Customer
	6/15/2020	480	6/15/2020	8308	Banco Rendimento Runs on RippleNet Cloud
	10/6/2020	498	10/6/2020	7528	Lemonway Joins RippleNet to Power Instant, Cost-Effective Euro-to-Euro Payments
	10/6/2020	498	10/6/2020	8299	Lemonway Leverages RippleNet To Unlock Faster Euro-To-Euro Payments
Litigation	5/5/2015	66	5/6/2015	7862	What Ripple's Fincen Fine Means for the Digital Currency Industry
	9/10/2018	360	9/10/2018	7549	Ripple and R3 Reach Settlement
	4/21/2020	466	4/21/2020	8316	Enough Is Enough: It's Time to Protect the Community
	4/21/2020	466	4/21/2020	7640	Ripple sues YouTube over cryptocurrency scams
	4/21/2020	466	4/21/2020	7641	Covid Scammers Are Taking Advantage of Big Tech Platforms, Says Ripple CEO
Market Commentary & Company Overview	6/13/2014	3	6/13/2014	7934	Cryptocurrency News Round-Up: Bitcoin Auction, Dogecoin Hacked & Ripple Swells
	7/9/2014	6	7/9/2014	7932	30 Innovators to Watch: Key Executives Shaping the Industry in 2014
	7/14/2014	5	7/14/2014	7931	Cross Border Remittance Ripe for Startups as Bank Abandon Business
	7/22/2014	8	7/22/2014	7929	Bitcoin for the Underbanked
	7/29/2014	10	7/29/2014	7928	BankThink Bank Payment Systems Still Operate Like CompuServe and AOL
	9/27/2014	14	9/27/2014	7922	The Internet's Missing Link
	10/22/2014	16	10/22/2014	7917	Apple's Mobile Buzz Impacts Bitcoin, but Regs Still Unclear

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Market Commentary & Company Overview	10/28/2014	18	10/28/2014	7915	When We Don't Own Who We Are
	11/3/2014	19	11/3/2014	7913	Money20/20 Day 1: Regulators, Finance Giants Forecast Bitcoin's Future
	11/3/2014	20	11/3/2014	7914	Ripple Labs CEO looks to revolutionise online payments
	11/20/2014	23	11/20/2014	7910	Why banks fear Bitcoin
	11/24/2014	24	11/24/2014	7909	Susan Athey On How Digital Currency Could Transform Our Lives
	12/2/2014	25	12/2/2014	7908	MasterCard Seeks 'Level Playing Field' for Bitcoin Regulation
	12/10/2014	27	12/10/2014	7902	Bitcoin for Rockstars
	12/21/2014	29	12/21/2014	7900	Why Bitcoin's Erratic Price Doesn't Matter
	12/29/2014	31	12/29/2014	7898	Rethink Identity So Personal Data Can Stay Personal
	1/6/2015	32	1/6/2015	7896	Block Chain 2.0: The Renaissance of Money
	1/8/2015	33	1/8/2015	7895	The magic of mining
	1/13/2015	34	1/13/2015	7894	There's a blockchain for that!
	1/14/2015	35	1/14/2015	7893	Did we solve a payments problem that no longer exists?
	1/18/2015	36	1/18/2015	7892	Federal Reserve Bank VP: We're a Protocol Just Like Bitcoin
	1/21/2015	38	1/21/2015	7887	Bill Gates on Mobile Banking, Connecting the World and AI
	1/21/2015	38	1/22/2015	7884	Bill Gates: Bitcoin Alone Won't Solve Global Payments Challenges
	1/22/2015	39	1/22/2015	7885	5 ways digital currencies will change the world
	1/26/2015	40	1/26/2015	7883	The Fed Has a Vision for Faster Payments; Does It Have the Will?
	1/29/2015	41	1/29/2015	7882	Fed's Payments Leaders Show Interest in Cryptocurrency, Privacy Tech
	2/11/2015	44	2/11/2015	7880	The Fed's Unexpectedly Bold Payments Idea
	2/16/2015	46	2/16/2015	7879	Policy Experts Talk Transparency in Bitcoin at Foreign Affairs Event
	2/23/2015	47	2/23/2015	7876	Digital-Only German Bank to Enter U.S. Market, Court Millennials
	2/25/2015	48	2/25/2015	7878	Heads and Tails: How Can Cryptocurrencies Enable Legal Cross-Border Money Transfers?
	3/3/2015	49	3/3/2015	7874	Welcome to the Internet of Value
	3/3/2015	50	3/3/2015	7875	Cryptocurrency Technology Set to Shake Up Correspondent Banking
	3/11/2015	52	3/11/2015	7873	Goldman Sachs Report Says Bitcoin Could Shape 'Future of Finance'
	3/15/2015	53	3/15/2015	7872	Cooldest Brands 2015: Ripple Labs
	4/7/2015	57	4/7/2015	7870	Banks Can Cherry-Pick the Best Bits from Bitcoin: Report
	4/8/2015	58	4/8/2015	7868	What's missing from Facebook's digital payments plan
	4/15/2015	59	4/15/2015	8586	Ripple Labs and Aite Group Host Webinar on Global Payments
	5/1/2015	64	5/1/2015	8582	CGAP: Why an Open Payments Infrastructure Matters for Financial Inclusion
	5/1/2015	64	5/1/2015	7859	The 'Ripple' Effect: Why an Open Payments Infrastructure Matters
	5/7/2015	67	5/7/2015	7860	The next big thing
	5/13/2015	68	5/13/2015	7858	EBADay: banks still best placed for payments
	5/14/2015	70	5/14/2015	8581	European Banking Association Emphasizes Promise of Distributed Ledgers
	5/14/2015	69	5/14/2015	7857	Blockchain manoeuvres: applying Bitcoin's technology to banking
	5/19/2015	72	5/20/2015	8579	NACHA Banks Approve Same-Day Settlement in U.S.
	5/29/2015	73	5/28/2015	8578	McKinsey: Why Banks Should Invest in Payments Infrastructure
	6/2/2015	75	6/2/2015	8577	Gates Foundation: Lessons Learned About Payments Systems
	6/4/2015	76	6/4/2015	8576	Daily Fintech: Real-time Payments is a Game-changer
	6/16/2015	79	6/16/2015	8574	Santander: Distributed Ledger Tech Could Save Banks \$20 Billion a Year
	6/19/2015	80	6/19/2015	7849	The Sea Change Ripple Labs Sees For FinTech
	6/19/2015	81	6/19/2015	7851	RBS pledges to boost resilience spend after latest IT failure
	7/2/2015	82	7/2/2015	8573	World Economic Forum Report: The Rise of Non-Traditional Payment Systems
	7/6/2015	83	7/6/2015	7850	Ravi Menon: A smart financial centre
	7/13/2015	84	7/13/2015	7848	FinTech: Will Blockchain Enable Better Banking?
	7/20/2015	85	7/20/2015	8572	McKinsey: New Partnership Models in Transaction Banking
	7/23/2015	86	7/23/2015	7847	BankThink Ripple's Overlooked Path to Decentralization
	8/1/2015	88	8/1/2015	7844	Ripple Labs: Opening Access to Finance
	8/3/2015	89	8/3/2015	7845	Ripple's Chris Larsen adds up savings for banks using distributed ledgers
	8/5/2015	90	8/5/2015	7842	49 Technology Pioneers to watch in 2015
	8/7/2015	91	8/7/2015	7843	Ripple Labs: smoothing the path to better payments

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Market Commentary & Company Overview	8/13/2015	92	8/13/2015	7841	Ripple well-placed for global adoption
	8/27/2015	93	8/27/2015	7840	Internet of Value: New Protocol Could Usher in Real-time Payments
	9/3/2015	95	9/3/2015	7839	Why we need a common standard for moving e-money
	9/22/2015	96	9/22/2015	8570	WEF Report: Distributed Financial Technology Goes Mainstream by 2027
	10/26/2015	100	10/26/2015	8569	BIS Describes Peak Correspondent Banking
	10/29/2015	101	10/29/2015	8568	Needham Report: Welcome to the Internet of Value
	10/30/2015	102	10/30/2015	8567	McKinsey: The Powerful Forces Reshaping the Payments Landscape
	11/2/2015	103	11/2/2015	8566	Money 20/20: How Banks Can Leverage Distributed Financial Technology
	11/5/2015	104	11/5/2015	8565	Blockchain Investment By Financial Institutions in One Chart
	11/10/2015	105	11/10/2015	8564	Correspondent Banking's Steady Decline
	11/12/2015	106	11/12/2015	8562	What the Blockchain Means for Banks
	11/12/2015	107	11/12/2015	8563	Financial Inclusion Can Generate \$380 Billion in Revenues for Banks
	11/19/2015	108	11/19/2015	8561	Why Banks Are Abandoning Traditional Cross-Border Payments in One Chart
	12/3/2015	109	12/3/2015	8560	Accenture Report: APAC Fintech Investments Signal Major Opportunity in Payments
	12/11/2015	111	12/11/2015	8559	Capgemini: Blockchain Tech Can Transform Global Financial Network
	12/17/2015	113	12/17/2015	7829	Ripple chief Chris Larsen: Sorting out payments will aid innovation in securities settlements
	1/4/2016	115	1/4/2016	8556	Every Business is a Payments Business
	1/6/2016	116	1/6/2016	8555	Wired: A Global Standard for Payments
	1/6/2016	117	1/6/2016	7836	The Plan to Unite Bitcoin With All Other Online Currencies
	1/12/2016	118	1/12/2016	7835	Blockchains Poised To Be The Hot Tech For Moving Money In 2016
	1/14/2016	120	1/14/2016	8553	Mike Hearn: Bitcoin Has Failed
	1/20/2016	122	1/20/2016	8551	IMF at Davos: Distributed Ledger Technology is Extremely Beneficial
	1/20/2016	123	1/20/2016	8552	Vermont Realizes They Don't Need the Blockchain
	1/22/2016	124	1/22/2016	8550	Chris Larsen at Davos: The Merging of the Web, the Physical Web and the Value Web
	1/25/2016	125	1/25/2016	8549	New DTCC White Paper Gets Real About Blockchain Hype
	1/27/2016	126	1/26/2016	8548	Highlights from the World Economic Forum 2016
	1/28/2016	128	1/28/2016	8547	Bank of England: How Our Modern Payment System Began at a Bar
	2/2/2016	129	2/2/2016	8544	Fed Releases Faster Payments Progress Report
	2/12/2016	131	2/12/2016	8543	The Block Chain Conference 2016: Highlights
	2/16/2016	132	2/16/2016	8542	Accenture on Ethics: Banks Could Boost Earnings by \$500 Million a Year
	2/23/2016	134	2/23/2016	8540	Ripple and XRP Can Cut Banks' Global Settlement Costs Up to 60 Percent
	3/11/2016	136	3/11/2016	8538	White & Case: the Blockchain Revolution in Financial Services
	4/7/2016	139	4/7/2016	7834	Ripple Aims to Put Every Transaction on One Ledger
	5/6/2016	145	5/6/2016	8531	Highlights from Consensus 2016
	5/10/2016	146	5/10/2016	8530	ECB Weighs in on Distributed Ledger Tech
	5/23/2016	147	5/23/2016	8529	Interledger: Beyond Blockchain
	6/2/2016	149	6/2/2016	7832	Meet the Real Bank of Mom and Dad
	6/14/2016	151	6/14/2016	8526	Japan Explores the Future of Blockchain
	6/16/2016	152	6/16/2016	8525	Goldman Sachs: Blockchain Billions
	6/27/2016	156	6/27/2016	7821	These are the 5 Hottest Companies in Fintech
	7/11/2016	157	7/11/2016	8522	Citi Research: Blockchain Tech Could Remake Payments Infrastructure
	7/20/2016	160	7/20/2016	8519	Bain: Distributed Ledger Tech Will Make Winners and Losers in Banking
	8/8/2016	162	8/8/2016	8517	Credit Suisse: Solving the Problems of Cross-Border Payments
	8/9/2016	163	8/9/2016	8516	SEPA in the Age of Real-Time Payments
	8/15/2016	164	8/15/2016	8515	WEF: Distributed Ledgers Are the Foundation of New Financial Infrastructure
	8/18/2016	166	8/18/2016	7818	Man Who Introduced Millions to Bitcoin Says Blockchain Is a Bust
	8/19/2016	167	8/19/2016	7816	Google and Apple like Ripple's Interledger Protocol for interoperability - and because it's not Visa
	8/19/2016	168	8/19/2016	7817	Overseas remittances' costs to reduce with new system
	9/15/2016	172	9/15/2016	7814	It Might Take Longer Than You Think For The Future Of Banking To Arrive
	9/21/2016	173	9/21/2016	8510	Chris Larsen on the Internet of Value
	10/5/2016	178	10/5/2016	8504	Three Key Takeaways from the Capgemini World Payments Report
	10/6/2016	179	10/6/2016	8503	Clearing Away the Debris With Distributed Ledger Technology

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Market Commentary & Company Overview	10/7/2016	180	10/7/2016	8502	Ovum Report: Corporate Treasurers Need More From Banks
	10/14/2016	182	10/14/2016	8500	McKinsey Report: By 2020, Payments Will Generate \$400 Billion More Per Year
	10/18/2016	184	10/18/2016	8498	Bank of England: Scaling Real-Time Gross Settlement
	11/10/2016	188	11/10/2016	8494	Keep Calm and Blockchain On
	11/14/2016	190	11/14/2016	8493	BNY Mellon: Reinventing Payments
	11/14/2016	189	11/14/2016	7802	Where Finance and Technology Come Together
	11/22/2016	192	11/22/2016	8491	KPMG: Future Bright for Next-Generation Payment Solutions
	11/28/2016	193	11/28/2016	8490	Santander and Reisebank Both Recognized for Innovation
	12/6/2016	195	12/6/2016	8488	Fed Distributed Ledger Tech Report Singles Out Interledger
	12/7/2016	196	12/7/2016	8487	McKinsey: Corporates Need Faster Payments, Too
	12/14/2016	198	12/14/2016	8485	Key Strengths of Distributed Ledger Tech from the Hong Kong Monetary Authority
	1/9/2017	200	1/9/2017	8484	Three Forces Shaping Payments: BCG Global Report
	1/12/2017	202	1/12/2017	8482	SWIFT GPI Part 3: the Empire Strikes Back
	1/13/2017	203	1/13/2017	8481	XRPに関する6つの迷信 (English translation follows)
	1/27/2017	205	1/27/2017	7799	Will Tech Titans Enter Payment Industry?
	2/6/2017	207	2/6/2017	8478	BAFT Europe Bank to Bank Highlights
	2/15/2017	208	2/15/2017	7798	Why Blockchain and Asia are A Perfect Match
	3/9/2017	215	3/9/2017	8471	Discussing Trends in Global Payments at the GCC Financial Forum
	3/20/2017	217	3/20/2017	7796	Sending Money Overseas to Get Faster Once Banks Pick a Winner
	5/4/2017	223	5/4/2017	7795	Financial technology is proving less of a battleground than feared
	6/14/2017	228	6/14/2017	7792	Inside Ripple's plan to make money move as fast as information
	7/31/2017	235	7/31/2017	8455	Ripple's Product Suite is Growing
	10/6/2017	243	10/6/2017	8448	10 Things You Need to Know About XRP
	10/17/2017	247	10/17/2017	8443	Swell Day 1: A former Fed Chair Speaks, The Practical Applications of Digital Assets, Blockchain and More
	10/18/2017	248	10/18/2017	8442	Swell Day 2: Words of Wisdom from the Inventor of the Web and Industry Leaders Discuss Which Blockchain Should Rule Them All
	10/26/2017	250	10/26/2017	8440	Top 3 Takeaways From Swell
	11/13/2017	251	11/13/2017	8439	Ripple Hosts World's Central Banks to Explore Next Generation of Payments
	11/17/2017	253	11/17/2017	7787	Ripple boss predicts central bank adoption of blockchain
	11/17/2017	253	11/17/2017	7791	Why the CEO behind one of the largest cryptocurrencies left AOL and Yahoo for blockchain
	12/5/2017	257	12/5/2017	7788	What will next year bring for cryptocurrencies? Ask our banking editor and Daniel Aranda, managing director for Europe at Ripple.
	12/7/2017	260	12/7/2017	8433	Internet of Value Depends on Interoperability, Not Blockchain Alone
	12/21/2017	267	12/21/2017	8427	Happy 5th Anniversary, XRP Ledger!
	12/22/2017	265	12/21/2017	7785	Bitcoin Is So 2017 as Ripple Soars at Year End: Chart
	12/26/2017	269	12/26/2017	7784	The Death of the ICO (And 4 Other 2018 Predictions)
	12/28/2017	270	12/28/2017	8424	The Most Popular Ripple Insights Posts of 2017
	12/28/2017	271	12/28/2017	7783	What is ripple, and what is XRP?
	12/29/2017	273	12/29/2017	7781	What the heck is Ripple? A brief look at the hottest cryptocurrency of the moment.
	12/29/2017	272	12/29/2017	7780	Ripple cryptocurrency surges as Japanese groups agree to use it
	12/30/2017	274	12/30/2017	7782	Digital currency ripple soars nearly 56 percent, becomes second-largest cryptocurrency by market cap
	12/31/2017	275	12/31/2017	7779	Ripple: cryptocurrency enjoys end-of-year surge – but will it endure?
	1/1/2018	276	1/1/2018	7777	Here are the top 10 cryptoassets of 2017 (and bitcoin's 1,000% rise doesn't even make the list)
	1/2/2018	277	1/2/2018	7776	These 3 Cryptos Have A Bigger Market Cap Than Exxon
	1/3/2018	278	1/3/2018	7775	Bitcoin May be King, but Ripple Dark Horse in Crypto Race
	1/4/2018	279	1/4/2018	7774	Cryptocurrency boom: Why everyone is talking about ripple
	1/5/2018	280	1/5/2018	7773	Ripple Steals Bitcoin's Thunder, Surges 1,135% in a Month
	1/9/2018	281	1/9/2018	8423	Who Really Cares About Real-time Payments?
	1/10/2018	283	1/10/2018	7772	Ripple, the Company behind Cryptocurrency XRP, is betting big on Asia
	1/10/2018	282	1/10/2018	7771	Ripple's XRP is the Hot New Cryptocurrency - Here's How You Buy It
	1/11/2018	285	1/11/2018	7778	Looking To Start A Blockchain Business? Ripple Founder Chris Larsen Has One Piece Of Advice
	1/16/2018	286	1/16/2018	7765	Ripple is sitting on close to \$80 billion and could cash out hundreds of millions per month — but it isn't
	1/18/2018	288	1/18/2018	8421	Top 9 Frequently Asked Questions About Ripple and XRP
	1/20/2018	289	1/20/2018	7764	Ripple Founder Chris Larsen Talks About The Many Use Cases For Blockchain

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	2/13/2018	298	2/13/2018	7750	Ripple CEO Favors More Regulation of the Crypto Market
	2/16/2018	301	2/16/2018	7748	Is it Ripple or Bitcoin Bringing Life To Cryptos?
	3/4/2018	307	3/4/2018	7743	How XRP Fits Into Ripple's Payments Products Explained
	3/7/2018	309	3/7/2018	7737	Ripple CEO Brad Garlinghouse on Fast Money
	3/7/2018	309	3/7/2018	7738	Ripple CEO tells cryptocurrency industry to 'work with the regulators'
	3/7/2018	310	3/7/2018	7740	Data Sheet—How Ripple Wants to Enhance, Not Kill, the Global Payments System
	4/25/2018	322	4/25/2018	8405	Ask Me Anything with Brad and Cory
	4/27/2018	325	4/27/2018	7719	7 Facts You Might Not Know About Ripple
	5/4/2018	326	5/4/2018	7718	The battle for the remittances market
	5/30/2018	334	5/30/2018	7710	Bitcoin's influence over cryptocurrency prices could end soon, says Ripple CEO
	5/30/2018	334	5/30/2018	7711	Momentum for Ripple continues to build: Ripple CEO
	6/4/2018	337	6/4/2018	7703	Brad Garlinghouse explains the difference between Ripple and XRP
	6/5/2018	340	6/5/2018	8396	Ripple CEO at Money20/20 Europe: Blockchain Hype Outpaces Reality
	6/5/2018	338	6/5/2018	7704	Bitcoin is not the 'panacea' people thought it would be, Ripple CEO says
	6/5/2018	339	6/5/2018	7705	Ripple and Swift slug it out over cross-border payments
	6/7/2018	341	6/7/2018	8395	American Express and Ripple at Money20/20 Europe: Changing the Cross-Border Payments Experience for SMEs
	6/18/2018	342	6/18/2018	7702	Everything you need to know about the blockchain
	7/13/2018	347	7/13/2018	8391	Ask Me Anything with David Schwartz and Asheesh Birla
	7/26/2018	349	7/26/2018	7698	Bitcoin is slow when you talk about moving money: Cory Johnson
	8/15/2018	352	8/15/2018	7696	Ripple 'definitely' wants to target China with its blockchain-based payments tech, exec says
	8/16/2018	354	8/16/2018	7695	Ripple's CTO invented a distributed computer system 20 years before blockchain – ask him about it
	8/22/2018	355	8/22/2018	8386	Ask Me Anything with Brad and Cory
	8/29/2018	356	8/29/2018	7693	Ripple's Chris Larsen: The Richest Person In Cryptocurrency
	9/5/2018	357	9/5/2018	7691	Ripple's Trillion-Dollar Man
	10/1/2018	369	10/1/2018	8377	CEO Brad Garlinghouse Talks Internet of Value and Customer Traction at Swell 2018
	10/2/2018	371	10/2/2018	8374	Swell 2018: Report Finds Tipping Point for Mass Adoption of Blockchain Is Near
	10/2/2018	372	10/2/2018	8375	Global Regulatory Policies Took Center Stage On Day One of Swell 2018
	10/11/2018	374	10/11/2018	8371	Crypto Regulation Around the World
	10/23/2018	377	10/23/2018	8368	David Schwartz Makes the Case for Blockchain in Payments at Money20/20 USA
	10/24/2018	378	10/24/2018	8367	Chris Larsen Reflects on Disruption, Regulation and the Internet of Value at Money20/20
	10/29/2018	380	10/29/2018	8365	The Ripple Drop - Episode 6
	11/7/2018	381	11/7/2018	8364	The 800 Pound Gorilla: Digital Asset Adoption
	11/12/2018	382	11/12/2018	8363	Blockchain and Digital Asset Use in ASEAN: CEO Brad Garlinghouse in Convo with IMF's Ross Leckow at Singapore Fintech Festival
	11/13/2018	383	11/13/2018	7683	Ripple Is Aiming to Overtake Swift Banking Network, CEO Says
	11/30/2018	387	11/30/2018	8359	The Ripple Drop - Episode 7
	12/26/2018	391	12/26/2018	8356	The Ripple Drop - Episode 8
	1/8/2019	393	1/8/2019	7681	Ripple wants a piece of the global payment system while it fights a cryptocurrency 'holy war'
	1/17/2019	395	1/17/2019	8354	A Global Look at the Future of Blockchain and Fintech Innovation
	1/30/2019	399	1/30/2019	7678	Ripple CEO: Decentralized payment systems are likely to win
	1/31/2019	400	1/31/2019	8352	The Ripple Drop - Episode 9
	2/8/2019	404	2/8/2019	8350	What's on the Regulatory Horizon for Digital Assets in the E.U.?
	2/28/2019	405	2/28/2019	8349	The Ripple Drop - Episode 10
	3/26/2019	408	3/26/2019	8347	Southeast Asia's Perfect Payments Storm
	3/28/2019	409	3/28/2019	8346	The Ripple Drop: Episode 11
	5/20/2019	415	5/20/2019	7670	Ripple CEO Brad Garlinghouse explains why big banks should get into cryptocurrencies
	5/30/2019	416	5/30/2019	7669	Ripple courting banks, paytech and big fintech to beat Swift to emerging markets
	7/29/2019	419	7/29/2019	7667	Ripple's Senior VP on the U S. Senate Cryptocurrency Hearing
	8/7/2019	421	8/7/2019	7666	The current state of crypto regulation is hurting US companies
	10/7/2019	430	10/7/2019	7662	Ripple CEO Not Bullish on Facebook's Ability to Launch Libra Cryptocurrency
	10/8/2019	434	10/14/2019	7661	Brad Garlinghouse, CEO of Ripple: One on One with the Man Running Ripple and XRP
	10/10/2019	432	10/10/2019	7660	Altcoins: Ahead of Libra, XRP cryptocurrency gains toehold in commerce

Category	Event Date	Event ID	Document Date	Document ID	Headline
[1]	[2]	[3]	[4]	[5]	[6]
Market Commentary & Company Overview	10/20/2019	437	10/20/2019	7657	XRP Is Up 30% On September As Bitcoin Flatlines—Ripple Sees It Going Even Higher
	10/23/2019	439	10/23/2019	7656	Ripple CEO: Facebook has a 'trust deficit'
	11/5/2019	440	11/5/2019	8333	Blockchain in Payments Report 2019: Flywheel Set in Motion
	11/6/2019	442	11/6/2019	7655	Ripple CEO Expects Volatility in Cryptocurrencies to Continue
	12/10/2019	446	12/10/2019	7652	Selling Blockchain To Enterprises: How Ripple And Others Make Money
	1/5/2020	449	1/5/2020	7649	Cross-border transactions key to connecting a fragmented region Opinion
	3/27/2020	463	3/27/2020	7643	"XRP is Not Centralized": Ripple SVP Addresses Crypto Community Criticism
	5/7/2020	472	5/7/2020	7638	The financial world's nervous system is being rewired
	5/16/2020	474	5/16/2020	7632	Navigating payments: emerging markets, COVID-19 and M&As
	6/18/2020	483	6/18/2020	8307	Policy Framework for Digital Assets in India
	6/20/2020	484	6/20/2020	7633	Ripple suggests a regulatory framework to keep India from banning cryptocurrencies — yet again
	7/28/2020	485	7/28/2020	7630	The Ripple Story: CTO David Schwartz on the Founding, Ledger & XRP
	7/30/2020	487	7/30/2020	8305	How the U.S. Can Pave the Way for Global Digital Asset Regulation - And Why It Should
	8/21/2020	491	8/21/2020	7626	The tech cold war is here — and the US isn't winning
	9/11/2020	493	9/11/2020	7624	Your Next Bank Will Be a Tech Giant
	10/1/2020	496	10/1/2020	7622	Blockchain Management Styles At 3 Systemically Important Financial Institutions Show A Diversity Of Strategies
	10/5/2020	497	10/5/2020	8300	Ripple's Mission in Action
	10/14/2020	501	10/14/2020	7619	'China is well ahead' of every country on global financial infrastructure: Ripple CEO
	10/15/2020	502	10/15/2020	8296	Blockchain in Payments Report 2020: From Adoption To Growth
	10/21/2020	504	10/21/2020	7618	Pandemic Put Tailwind Behind Crypto Markets: Ripple Labs
	11/13/2020	510	11/13/2020	7614	Brad Garlinghouse explains how regulatory uncertainty around XRP has affected Ripple
	11/19/2020	511	11/19/2020	7613	Bitcoin bulls and bears: Tech execs discuss what's in store for cryptocurrency
	12/2/2020	512	12/2/2020	7612	Ripple CEO on what's driving cryptocurrency
Markets Report	4/18/2017	221	4/18/2017	8466	Q1 2017 XRP Markets Report
	7/20/2017	233	7/20/2017	8457	Q2 2017 XRP Markets Report
	10/19/2017	249	10/19/2017	8441	Q3 2017 XRP Markets Report
	4/25/2018	323	4/25/2018	8406	Q1 2018 XRP Markets Report
	7/24/2018	348	7/24/2018	8390	Q2 2018 XRP Markets Report
	10/25/2018	379	10/25/2018	8366	Q3 2018 XRP Markets Report
	1/24/2019	397	1/24/2019	8353	Q4 2018 XRP Markets Report
	4/24/2019	413	4/24/2019	8345	Q1 2019 XRP Markets Report
	10/18/2019	436	10/18/2019	8335	Q3 2019 XRP Markets Report
	1/22/2020	451	1/22/2020	8327	Q4 2019 XRP Markets Report
	4/30/2020	470	4/30/2020	8314	Q1 2020 XRP Markets Report
	8/3/2020	489	8/3/2020	8304	Q2 2020 XRP Markets Report
	11/5/2020	509	11/5/2020	8294	Q3 2020 XRP Markets Report
Milestone	5/18/2015	71	5/18/2015	7585	Ripple Labs Closes \$28 Million Series A Funding Round
	5/18/2015	71	5/18/2015	8580	Ripple Labs Raises \$28 Million From IDG Capital Partners, CME Group, Seagate, and Others
	5/18/2015	71	5/19/2015	7855	Ripple Labs Closes \$28 Million in Funding
	5/18/2015	71	5/19/2015	7856	BitBeat: NYSE Launches Bitcoin Index, Ripples Gets \$28 Million
	10/6/2015	99	10/6/2015	7580	Ripple Adds Santander InnoVentures Fund as Series A Investor
	10/6/2015	99	10/6/2015	7838	Ripple Gets \$4M From Santander Arm, Inks Partnership With Accenture
	10/6/2015	99	10/22/2015	7831	Santander plans to become 'Ripple evangelist'
	1/29/2016	127	1/28/2016	7578	Ripple Strikes Multi-National Deal with SBI Holdings to Meet Growing Demand for Ripple Solutions Across Asia
	1/29/2016	127	1/28/2016	8546	Ripple's Deal With Japanese Multinational Opens Door for Rapid Asian Expansion
	6/13/2016	150	6/13/2016	8527	Ripple Receives New York's First BitLicense for an Institutional Use Case of Digital Assets
	6/13/2016	150	6/13/2016	7824	Ripple Wins BitLicense from New York Regulator
	9/15/2016	170	9/15/2016	7573	Ripple Raises \$55 Million in Series B Funding
	9/15/2016	170	9/15/2016	8512	Ripple Raises \$55 Million in Series B Funding
	9/15/2016	170	9/15/2016	7809	Fintech Firm Ripple Gets \$55 Million In Funding

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[1]	[2]	[3]	[4]	[5]	[6]
Milestone	9/15/2016	170	9/15/2016	7810	Blockchain payments startup Ripple raises \$55 million
	9/15/2016	170	9/15/2016	7811	Ripple Just Raised \$55 Million and Signed on These Major Bank Partners
	9/15/2016	170	9/15/2016	7812	StanChart invests in blockchain startup Ripple
	9/15/2016	170	9/15/2016	7813	Google-backed blockchain start-up Ripple raises \$55 million from big banks
	9/15/2016	170	9/15/2016	7815	Ripple Raises \$55 Million, Adds Seven More Banks to Its Network
	5/16/2017	225	5/16/2017	8463	Ripple to Place 55 Billion XRP in Escrow to Ensure Certainty of Total XRP Supply
	5/26/2017	227	5/26/2017	7793	Bitcoin rival Ripple is suddenly sitting on billions of dollars worth of cryptocurrency
	12/8/2017	259	12/7/2017	8432	Ripple Escrows 55 Billion XRP for Supply Predictability
	12/20/2019	448	12/20/2019	8329	Ripple Caps Record Year With \$200 Million Series C Funding
	12/20/2019	448	12/20/2019	7650	Ripple Raises \$200 Million as Part of Bid for XRP Adoption
Miscellaneous	11/17/2014	22	11/17/2014	7911	RBS embraces crypto-currencies in hackathon challenge
	11/28/2017	256	11/28/2017	8435	TechCrunch Founder Michael Arrington Launches \$100M Crypto Fund with XRP
	11/28/2017	256	11/28/2017	7789	Michael Arrington Has a New \$100 Million Hedge Fund That Will Be Valued in Ripple's XRP
	6/27/2018	343	6/27/2018	7701	Coinbase CEO Launches Crypto Charity Fund, Aims to Raise \$1 Billion
	10/6/2020	499	10/6/2020	7621	Ripple threatens to leave U.S. over crypto regulation
	10/23/2020	506	10/23/2020	7617	\$10 billion crypto firm Ripple considers relocating to London over U.S. regulation
Office & Staff	1/20/2015	37	1/20/2015	7591	Former Chief White House Advisor Gene Sperling Joins Ripple Labs Board of Directors
	1/20/2015	37	1/20/2015	7890	Ripple Labs Names Former Obama Advisor to Board of Directors
	1/20/2015	37	1/20/2015	7891	Ripple Labs appoints ex-White House advisor Gene Sperling to board of directors
	1/20/2015	37	1/21/2015	7888	Transition: Sperling Joins Ripple Labs Board
	1/20/2015	37	1/20/2015	7889	Bitcoin company Coinbase lands \$75m investment from NYSE and BBVA
	3/18/2015	54	3/18/2015	7588	Ripple Labs Names Former State Department Official Anja Manuel as Advisor
	4/6/2015	56	4/6/2015	7587	Ripple Labs Expands to Asia Pacific to Serve Regional Demand for Ripple's Real-Time Settlement Protocol
	4/6/2015	56	4/8/2015	7869	Asia-Pacific's Heating Up for U.S. Payment Expansion Plays
	4/16/2015	60	4/16/2015	7586	Brad Garlinghouse Joins Ripple Labs as Company's First Chief Operating Officer
	4/16/2015	60	4/16/2015	7866	Ripple Labs Hires Brad Garlinghouse As Its COO
	4/16/2015	60	4/16/2015	7867	Garlinghouse, Former Yahoo Executive, Joins Startup Ripple Labs
	6/1/2015	74	6/1/2015	7584	Ripple Labs Names Donald Donahue as Advisor
	6/1/2015	74	6/1/2015	7854	Ripple Labs names former DTCC boss Donahue as an advisor
	7/29/2015	87	7/29/2015	7583	Ripple Labs Names Michael S. Barr as Advisor
	7/29/2015	87	7/29/2015	7846	Ripple Labs names Michael Barr as advisor
	8/31/2015	94	8/31/2015	7581	Bret Allenbach Joins Ripple Labs as Chief Financial Officer
	3/21/2016	138	3/21/2016	7577	Ripple Continues Global Growth With New London Office to Serve European Bank Demand
	4/11/2016	140	4/11/2016	7576	HSBC Executive and SWIFT Board Member Joins Ripple to Support Continued Global Growth
	4/11/2016	140	4/11/2016	8536	HSBC Executive and SWIFT Board Member Joins Ripple
	6/20/2016	153	6/20/2016	8524	Ripple Continues Global Growth with New Luxembourg Office to Support Protocol Neutrality
	11/1/2016	187	11/1/2016	7569	Amid High Growth, Ripple's Chris Larsen Appoints Brad Garlinghouse Chief Executive Officer
	11/1/2016	187	11/1/2016	8495	A New Chapter for Ripple
	11/1/2016	187	11/1/2016	7804	Bitcoin-Technology Pioneer Chris Larsen to Step Down as Ripple CEO
	11/1/2016	187	11/1/2016	7805	Brad Garlinghouse takes over as CEO of payments startup Ripple
	11/30/2016	194	11/30/2016	8489	CME Group Executives Miguel Vias Joins Ripple
	2/23/2017	211	2/23/2017	8475	Ripple Welcomes Ken Kurson to its Board of Directors
	4/12/2017	220	4/12/2017	8467	Ripple Hires Former Business Director at SWIFT gpi Marjan Delatinne
	8/25/2017	238	8/25/2017	8453	Former State Department Official Anja Manuel Joins Ripple's Board of Directors
	9/5/2017	240	9/5/2017	8451	Ripple Launches New Mumbai Office to Serve India's Digital Economy
	9/25/2017	242	9/25/2017	8449	Ripple Supports Singapore's Fintech Hub Aspirations With New Office
	11/21/2017	254	11/21/2017	7563	Ripple Appoints Former New York State Superintendent of Financial Services Benjamin Lawsky to Its Board and Ron Will as CFO
	11/21/2017	254	11/21/2017	8437	Ripple Welcomes New Board Member Benjamin Lawsky
	12/19/2017	264	12/19/2017	8429	Zoe Cruz Joins Ripple's Board of Directors
	3/8/2018	311	3/8/2018	7736	Ripple hires Bloomberg TV's Cory Johnson as chief market strategist

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Office & Staff	3/17/2018	312	3/17/2018	7735	Ripple's new chief market strategist: Crypto regulation will 'separate the wheat from the chaff'
	7/11/2018	346	7/11/2018	8392	Ripple Welcomes Kahina Van Dyke as Senior Vice President in Business and Corporate Development
	7/11/2018	346	7/11/2018	8393	Two Big Changes to Our Leadership Team
	7/11/2018	346	7/11/2018	7699	Ripple Hires Facebook Payments Exec and Names New CTO
	1/30/2019	398	1/30/2019	7543	Stuart Alderoty Joins Ripple as General Counsel
	1/30/2019	398	1/30/2019	7677	Ripple Hires General Counsel from Lending Giant CIT Group
	4/8/2019	411	4/8/2019	7673	Ripple aims to make a splash in Asia with expansion of Singapore office
	4/25/2019	414	4/25/2019	7541	Yoshitaka Kitao Joins Ripple Board of Directors
	6/11/2019	417	6/11/2019	7540	Provider of Solutions for Global Payments from Silicon Valley Officially Launches Operations in Brazil
	10/22/2019	438	10/22/2019	7536	Craig Phillips Joins Ripple Board of Directors
	10/22/2019	438	10/22/2019	8334	Ripple Expands Global Regulatory Team in D.C. and Joins the Blockchain Association
	3/18/2020	461	3/18/2020	7644	Ripple Taps Senior Exec for Regional Expansion
	12/15/2020	513	12/14/2020	8293	Ripple Adds Sandie O'Connor To Board of Directors
	12/15/2020	513	12/15/2020	7527	Ripple Adds Sandie O'Connor to Board of Directors
	12/15/2020	513	12/15/2020	7611	Ripple Board Lands JPMorgan Veteran and Regulatory Expert Sandie O'Connor
Other Initiatives	2/10/2015	43	2/10/2015	8588	Ripple Labs joins the Center for Financial Services Innovation
	2/12/2015	45	2/12/2015	7589	Ripple Labs Joins W3C Web Payment Interest Group to Help Set Standards for the Value Web
	3/4/2015	51	3/4/2015	8587	Ripple Labs Joins International Payments Framework Association
	6/15/2015	78	6/15/2015	8575	Ripple Labs Elected to Fed Steering Committee for Faster Payments
	6/15/2015	78	6/19/2015	7852	Ripple Labs' Ryan Zagone Joins Fed's Faster Payment Task Force
	1/30/2018	294	1/30/2018	7759	SBI Ripple Asia Forms Consortium to Bring DLT to Securities
	3/28/2018	316	3/28/2018	7733	Ripple Joins Hyperledger Blockchain Consortium
	6/4/2018	336	6/4/2018	7552	Ripple Announces \$50M University Blockchain Research Initiative
	6/4/2018	336	6/4/2018	8397	Ripple Introduces the University Blockchain Research Initiative
	6/4/2018	336	6/4/2018	7706	Ripple Pumps \$50 Million Into Academic Research on Blockchain
	6/4/2018	336	6/4/2018	7707	Why Classes on Cryptocurrency, Blockchain, and Bitcoin Are About to Boom at Colleges
	6/4/2018	336	6/4/2018	7708	Crypto start-up Ripple donates \$50 million to top universities to boost blockchain adoption
	1/23/2019	396	1/23/2019	7679	Ripple Partners With Chinese University for Blockchain Research Program
	2/7/2019	403	2/7/2019	8351	University Blockchain Research Initiative Expands Global Footprint with 11 New Partners
	2/7/2019	403	2/8/2019	7542	Ripple Announces New University Blockchain Research Initiative Partners, Expands to China and Singapore
	7/30/2019	420	7/30/2019	7538	Ripple Expands University Blockchain Research Initiative Program to Japan, Supports 33 University Partners Across 14 Countries
	6/10/2020	479	6/10/2020	8309	ISO 20022: Shaping the Future of Cross-Border Payments
	6/18/2020	482	6/18/2020	8306	Why Ripple Supports PayString
	6/18/2020	482	6/18/2020	7634	Ripple launches PayID allowing users to send digital payments across different platforms
	8/26/2020	492	8/26/2020	8303	UBRI Expands To New Global Markets With More Than 35 University Partners
	9/30/2020	495	9/30/2020	7529	Ripple Leads Sustainability Agenda to Achieve Carbon Neutrality By 2030
	9/30/2020	495	9/30/2020	8301	Leading the Way on Global Crypto and FinTech Sustainability
	9/30/2020	495	9/30/2020	7623	Energy Web Is Starting With Ripple in Its Bid to Make Crypto Provably Green
	11/2/2020	508	11/2/2020	7615	Cryptocurrency's carbon footprint is massive and not sustainable
Ripple Commercialization Initiatives	9/23/2016	174	9/23/2016	7571	Major Banks Launch Global Payments Steering Group
	9/23/2016	174	9/23/2016	8509	Announcing Ripple's Global Payments Steering Group
	3/30/2017	218	3/30/2017	8469	MUFG Joins Ripple's Global Payments Steering Group
	10/13/2017	245	10/13/2017	8446	Ripple Rolls Out \$300M RippleNet Accelerator Program to Grow Volume and XRP Utility
	12/19/2017	263	12/19/2017	8428	Exploring Innovation in Payment System Infrastructures
	12/19/2017	263	12/21/2017	7786	Ripple Ramps Up Focus On Blockchain Infrastructure
	5/14/2018	330	5/14/2018	8401	Welcome to Xpring
	5/14/2018	330	5/14/2018	7714	Ripple is going after startups to build an ecosystem around the XRP cryptocurrency
	5/14/2018	330	5/24/2018	7712	Ripple's Xpring Isn't Quite a Venture Fund—It's More
	10/2/2019	428	10/2/2019	8340	Announcing the Next Chapter of Xpring, Ripple's Developer Platform
	10/2/2019	428	10/2/2019	7663	Ripple's Xpring Releases Technology To Bring XRP To The Internet

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[1]	[2]	[3]	[4]	[5]	[6]
Ripple Commercialization Initiatives	10/8/2020	500	10/8/2020	8298	Fund Instant Cross-Border Payments With a Line of Credit From RippleNet
	10/8/2020	500	10/8/2020	7620	Ripple Enters Lending With XRP Credit Lines to Fund Global Payments
Trading Platforms	2/29/2016	135	2/29/2016	8539	Ripple Partners with Crypto Facilities for XRP Derivatives
	10/9/2016	181	10/10/2016	8501	Ripple Announces XRP Futures Trading on Crypto Facilities
	10/27/2016	186	10/27/2016	8496	Coincheck Lists XRP on Its Digital Asset Exchange
	1/10/2017	201	1/10/2017	8483	Bitstamp Now Trading XRP with 0% Fees
	1/10/2017	201	1/10/2017	7800	Bitstamp adds Ripple currency XRP to trading platform
	2/16/2017	210	2/16/2017	8476	XRP/BTC Now Available on Bitstamp
	5/18/2017	226	5/18/2017	7567	XRP Liquidity to Increase With Listings on Six New Exchanges
	5/18/2017	226	5/18/2017	8462	XRP Liquidity to Deepen with Listings on Six New Exchanges
	8/31/2017	239	8/31/2017	8452	It's Never Been Easier to Access and Store XRP
	12/21/2017	266	12/21/2017	8426	XRP Now Available on 50 Exchanges Worldwide
	1/30/2018	295	1/30/2018	8419	SBI Virtual Currencies to Exclusively List XRP at Launch
	3/28/2018	317	3/28/2018	7731	Ripple's XRP now available from US-based crypto bank Uphold
	3/28/2018	317	3/29/2018	8410	XRP Ecosystem Grows with New Listing on Uphold
	8/16/2018	353	8/16/2018	7550	xRapid Brings on Three New Exchange Partners
	8/16/2018	353	8/16/2018	8387	xRapid Brings on Three New Exchange Partners
	8/16/2018	353	8/16/2018	7694	Ripple Endorses 'Preferred' Crypto Exchanges for XRP Payments
	2/12/2020	455	2/12/2020	8323	BRD Supports XRP and Launches Enterprise Expansion

Notes:

[1]: Assigned news classification.

[2]: Identification number assigned to event.

[3]: Date assigned to event in UTC time.

[4]: Identification number assigned to document.

[5]: Document date of publication expressed in local time.

[6]: Headline of document.

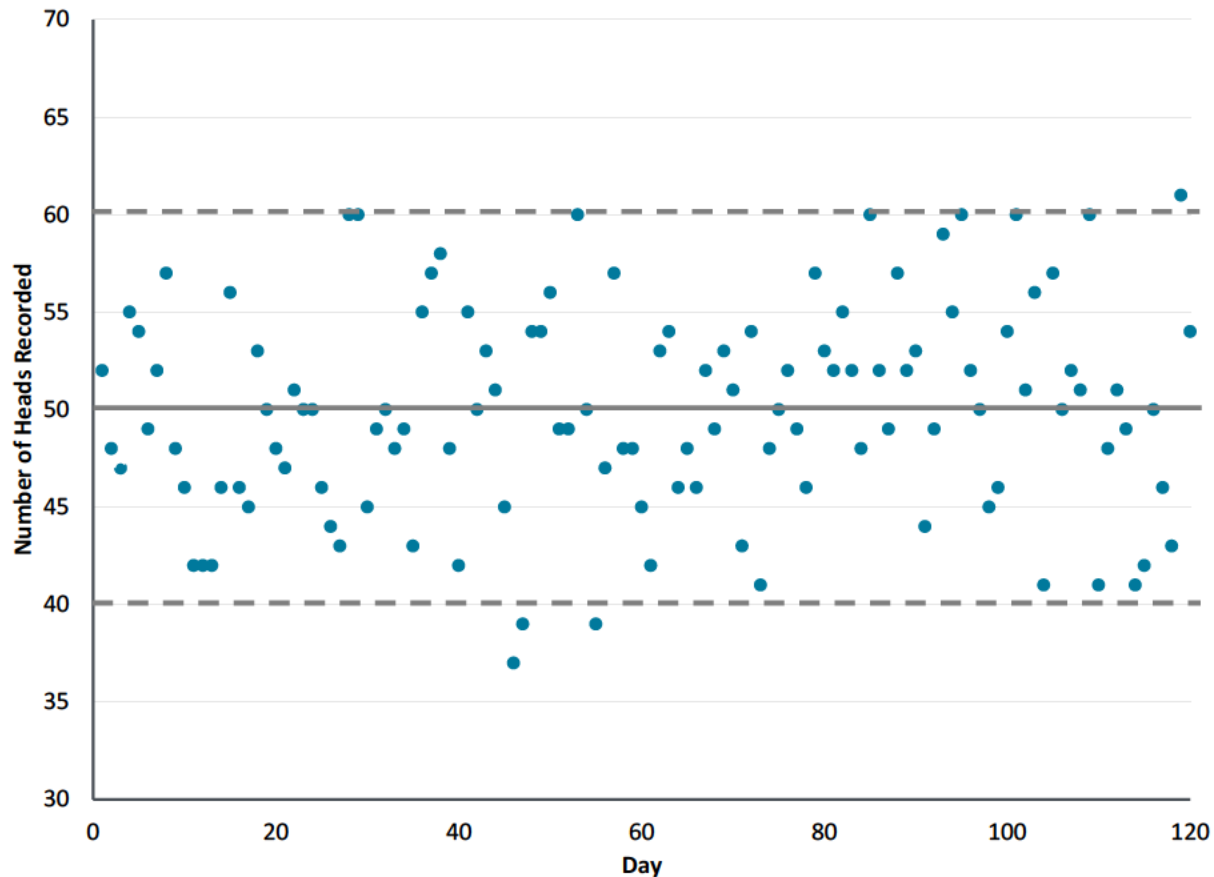
APPENDIX D

ADDITIONAL DETAILS OF THE ANALYTICAL METHODOLOGY

1. In this Appendix I provide additional details on certain aspects of the analytical methodology. I begin with a detailed primer on event studies in general, and then proceed to discuss my method for dating the events identified in my news sources.

A. THE EVENT STUDY METHODOLOGY

2. An event study is conducted by first specifying a model of *expected* price movements and then testing the extent to which *actual* price movements differ from those expectations. The key question an event study answers is whether the differences between actual and expected price movements are sufficiently large that, from a statistical standpoint, such differences are unlikely to be explained by randomness. In this context, “randomness” refers to the tendency for *actual* outcomes (in this case, the actual price movement) to deviate from the *expected* outcomes in ways which appear random in nature. Below is a simple example to illustrate these ideas.
3. Suppose that Company X flips a coin 100 times each day, and the stock return of Company X is equal to the percentage of times the coin comes up Heads. Suppose that we know that the coin is fair, meaning there is a 50/50 chance of getting Heads. This means we expect to record 50 Heads out of 100 flips. However, in practice, we will not always record 50. Some days we will record a few more, and some days a few less. The *actual* outcomes will often differ from the *expected* outcome in any particular case (though, by definition, not “on average”).
4. Figure 1 below presents some simulated data of this process: 100 random flips each day for 120 days, each flip having a 50% chance of generating a “Head.” In this set of simulated data, the average number of Heads per day is 49.95. However, only 10 out of the 120 days resulted in an outcome of exactly 50 Heads. Statisticians have a well-developed understanding of this problem and use what are called “confidence intervals” to describe the likelihoods of different outcomes. Figure 1 plots the expected number of Heads (50) and the statistical 95% confidence interval (indicated by the dotted lines). The “95% confidence interval” means that there is only a 5% chance (based on pure randomness) of observing an outcome which is outside the interval. Figure 1 shows that 95% of the time the number of Heads will range between 40 and 60, and only 5% of the time will it be less than 40 or more than 60, *if the coin is fair*. In other words, “random variation” can account for approximately 95 percent of outcomes ranging from 40 to 60 Heads from Company X flipping a fair coin 100 times.

APPENDIX D**FIGURE 1: DISTRIBUTION OF REPORTED HEADS WITH 95% CONFIDENCE INTERVAL**
(Expected Value = 50, 100 Tosses)

5. Now suppose that tomorrow, Company X will purchase a new coin which might (or might not) be a fair coin. If tomorrow we record 42, or 58, or 47, or indeed any number of Heads between 40 and 60, we would not regard such an outcome as unusual for flipping a fair coin. In other words, we could not reject the hypothesis that Company X was still using a fair coin in order to generate returns.
6. But what if instead we record 65 Heads? That represents a deviation of 15 away from our expectation of 50 and is well outside the “95% confidence interval.” Statistically we can say that the likelihood of observing an *actual* outcome which is 15 or more away from our expected outcome is less than 0.5% (i.e., this would occur approximately once in 300 days).¹ While such an outcome is not impossible from a fair coin, we can say that it is highly unlikely. Instead, it is more likely that the weight of the coin has changed. Suppose further that we find news reports indicating that Company X was hoping to purchase a heavier coin designed to produce more Heads. This qualitative information, combined with our statistical observation, suggests that the outcome of 65 Heads was most likely caused by a new coin that is not a fair coin. This is the basic logic applied in an event study methodology.

¹ The cumulative probability of observing 65 or more Heads or 35 or fewer Heads across 100 tosses of a fair coin is 0.35%, which is approximately equal to $1/300 = 0.33\%$.

APPENDIX D

7. Returning to the matter at hand, I specify several models of expected XRP price movements and then test the extent to which actual price movements differ from those expectations. A well-accepted method for performing such a statistical analysis is to estimate a regression model over some period of time (an “estimation window”) to quantify the typical relationship between the market price of the relevant instrument on the one hand and explanatory factors (often other market prices) on the other.
8. I consider several regression models using data from the prior 180 trading days (roughly six months) up to four days prior to the date of interest.² In each model, I regress the XRP return on a set of explanatory factors. As an example, one of the models (Model 7) I consider may be written as (“Equation 1”):

$$XRP_t = \alpha + \beta_1 BTC_t + \beta_2 ETH_t + \beta_3 XLM_t + \varepsilon_t$$

9. Here, XRP_t is the XRP return on date t , BTC_t , ETH_t , XLM_t are the return on Bitcoin, Ether, and Lumens on date t , respectively, α is the average difference, and ε_t is the random factor on date t .³
10. In the framework above, the estimation window (i.e., the 180-day window used to estimate the regression) will change with different dates of interest. This is typically referred to as a “rolling estimation window” (since the estimation window is “rolled forward” for each subsequent date of interest and the length of the estimation window remains the same). By using a rolling estimation window, I allow for the relationship between the XRP prices and the explanatory factors, as well as the volatility of the random factor, ε_t , to change over time. Use of a rolling model to account for changing volatility and evolving relationships among factors is well accepted in practice and peer-reviewed literature.⁴
11. I then use the model to estimate the expected XRP return on each date, and measure the corresponding unexpected or abnormal return, i.e., the difference between the actual XRP return and the expected XRP return predicted by the model. The estimates from the regression model are also used to form a measure of the “statistical significance” of that abnormal return.
12. For example, the return on XRP on May 17, 2018 (a day selected at random) is -6.8%. My analysis examines whether this return is statistically significantly different from expectations where “expectations” are based on the model I described above. Applying the model yields an expected (or “predicted”) return of -5.7% for XRP for May 17, 2018.⁵ The excess or abnormal return is then calculated as the difference between the actual return and the predicted return, which equates to -1.1%.

² A. Craig MacKinlay, “Event Studies in Economics and Finance,” *Journal of Economic Literature* Vol. 35, 1997, pp. 13-39 at p. 15: “For example, in an event study using daily data and the market model, the market model parameters could be estimated over the 120 days prior to the event.” For traditional securities, 120 trading days corresponds to about six calendar months, or about 180 trading days for a digital token such as XRP which trades every day.

³ Following standard practice, I calculate the return to any instrument on date t as the difference in log prices of dates t and $t - 1$.

⁴ Phillip A. Braun, Daniel B. Nelson, & Alain M. Sunier, “Good News, Bad News, Volatility, and Betas,” *The Journal of Finance* Vol. 50 (5), 1995, pp. 1575-1603 at pp. 1575, 1597.

⁵ The returns on BTC, ETH, and XLM on the same day are -3.3%, -5.0%, and -6.5% respectively. The predicted return is found as follows: $-5.7\% = -0.14 * -3.34\%$ (Coefficient on BTC *times* BTC return) $+ 0.56 * -4.99\%$ (Coefficient on ETH *times* ETH return) $+ 0.49 * -6.54\%$ (Coefficient on XLM *times* XLM return) $- 0.15\%$ (constant term from regression).

APPENDIX D

13. To test whether an abnormal return value of -1.1% falls within a statistically defined confidence interval, or whether it is statistically unusual, I need a measure of the statistical variation of the abnormal return. The test for whether randomness alone can account for an abnormal return of -1.1%, or whether some other factor not currently controlled for in the regression likely contributed to such a return, is often based on what is known as the “t-statistic.” The t-statistic is the value of the abnormal return divided by its standard deviation and represents the number of standard deviations between the actual return and the predicted return. Under fairly general conditions, one would expect that 95% of the time, a value drawn at random would fall within ± 1.96 standard deviations of its expected value, or that 95% of the time, the value would be less than +1.6649 standard deviations of its expected value.⁶ Values further away become statistically unlikely if the underlying model of the data remains valid. Returning to the coin-flipping example, it’s similar to saying that an outcome of 65 Heads is unlikely *if Company X is continuing to flip a fair coin*. Instead, it becomes more likely that some other factor, outside the model is, is driving the abnormal return that day (e.g., Company X has purchased a new coin that is not a fair coin).
14. In this example of the XRP return on May 17, 2018, an abnormal return of -1.1% is within the range of “typical” values; its t-statistic is just -0.13. In other words, there is no statistical evidence to suggest that anything beyond the usual random variation is affecting XRP returns on May 17, 2018.
15. The regression methodology I apply in this matter thus provides a scientific basis to test whether the actual XRP returns will fall within a reasonable distance of the predicted return unless there is some non-random explanation. Such a non-random explanation could be the influence of company-specific news revealed to the market on the event day.

B. IDENTIFYING THE DATE OF THE NEWS

16. The universe of documents comprised of Ripple Press Releases, Insight Articles, and Newsroom Articles identifies a set of events. To incorporate an event into my event study, it is necessary to assign a Coordinated Universal Time (“UTC”) date to that event since my data on digital token prices are measured in UTC-defined days.
17. For example, for a Ripple press release dated January 1 PT, it is possible that its UTC date is January 2. To account for time zone differences, I may review the published time indicated in the html code of the web page presenting the document if my statistical conclusions would be sensitive to such a difference.
18. It is also possible that a party other than Ripple, or a party other than the source Ripple linked to in its Newsroom, reported the news of the event earlier than my source would indicate. In some cases I conduct a broader search including Factiva, LexisNexis, and internet searches to determine if the event was reported earlier through some other news channel. I also consider the time stamps on related Tweets issued by the official Ripple account. I date an event by the earliest day I am aware of that the information was released to the market.

⁶ This is the case when data are distributed according the Gaussian or “Normal” distribution. The cutoff point of 1.96 is known as the “critical value” for a “two-sided” test. The critical value of the t-test may be adjusted from 1.96 if there is reason to believe the abnormal returns are not Normally distributed, or if a different level of significance is sought, or if a one-sided test is appropriate. The critical value of 1.6449 corresponds to the 5% one-sided test.

**Significance of Correlation Between XRP Price Increases and Announcements:
Milestone Events**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.00***	0.00***	0.01***	5.70*
2	0.01***	0.04***	0.82***	4.52**
3	0.02***	0.06***	0.01***	0.05***
4	0.19***	0.42***	0.07***	0.04***
5	0.02***	0.06***	0.01***	0.16***
6	0.26***	0.74***	0.12***	0.08***
7	0.01***	0.05***	0.00***	0.00***
8	0.21***	0.77***	0.10***	0.06***
9	0.02***	0.00***	0.01***	0.69***
10	0.23***	0.06***	0.05***	0.51***
11	0.00***	0.00***	0.00***	0.60***
12	0.22***	0.55***	0.82***	0.64***
13	0.02***	0.05***	0.01***	0.07***
14	0.24***	0.60***	0.08***	0.06***
15	0.02***	0.06***	0.01***	0.19***
16	0.38***	0.91***	2.57**	2.57**
17	0.02***	0.05***	0.00***	0.00***
18	0.32***	1.00**	0.12***	2.57**
19	0.02***	0.00***	0.00***	0.00***
20	0.02***	0.07***	0.08***	0.07***

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:
Milestone Events Excluding Escrow Events**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.07***	0.14***	0.46***	3.26**
2	0.05***	0.11***	0.32***	2.57**
3	1.12**	1.96**	0.55***	0.27***
4	0.78***	1.40**	0.36***	0.23***
5	1.99**	3.13**	1.21**	0.89***
6	1.26**	2.55**	0.74***	0.57***
7	1.48**	3.09**	0.83***	0.66***
8	1.10**	2.62**	0.64***	0.47***
9	1.14**	0.20***	0.46***	3.71**
10	0.89***	0.16***	0.30***	3.04**
11	0.08***	0.16***	0.40***	0.23***
12	0.05***	0.14***	0.32***	0.25***
13	1.06**	1.84**	0.49***	0.35***
14	0.92***	1.81**	0.40***	0.31***
15	1.90**	3.13**	1.11**	1.01**
16	1.62**	2.93**	0.83***	0.83***
17	1.68**	2.89**	0.74***	0.85***
18	1.45**	3.13**	0.76***	0.83***
19	1.06**	0.18***	0.41***	0.33***
20	0.07***	0.20***	0.39***	0.36***

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:
New Trading Platform Listings**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.13***	0.26***	0.32***	0.17***
2	0.60***	1.32**	0.16***	0.09***
3	0.14***	0.40***	0.47***	0.19***
4	0.58***	1.39**	0.21***	0.14***
5	0.14***	0.38***	3.35**	2.30**
6	0.51***	1.70**	1.82**	1.31**
7	0.67***	0.37***	2.02**	1.58**
8	0.40***	1.79**	1.47**	0.97***
9	1.00**	0.40***	0.30***	0.18***
10	0.65***	1.83**	0.14***	0.11***
11	0.15***	0.34***	0.28***	0.18***
12	0.09***	0.26***	0.01***	0.01***
13	0.13***	0.35***	0.39***	0.32***
14	0.09***	0.31***	0.02***	0.02***
15	1.00**	0.38***	3.00**	2.68**
16	0.09***	0.33***	0.23***	0.23***
17	0.84***	2.10**	0.20***	0.26***
18	0.07***	0.38***	0.02***	0.02***
19	0.12***	0.33***	0.30***	0.22***
20	0.12***	0.37***	0.02***	0.02***

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:
New Trading Platform Listings Indicating Ripple Action**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.07***	0.12***	0.39***	0.24***
2	0.65***	1.21**	0.23***	0.15***
3	0.07***	0.18***	0.54***	0.27***
4	0.63***	1.27**	0.29***	0.20***
5	0.07***	0.17***	5.71*	4.39**
6	0.57***	1.49**	3.75**	2.98**
7	0.71***	0.17***	4.02**	3.39**
8	0.48***	1.55**	3.22**	2.43**
9	0.97***	0.18***	0.38***	0.26***
10	0.69***	1.58**	0.21***	0.17***
11	0.07***	0.15***	0.36***	0.25***
12	0.05***	0.12***	0.01***	0.01***
13	0.07***	0.16***	0.46***	0.39***
14	0.05***	0.14***	0.02***	0.01***
15	0.97***	0.17***	5.29*	4.88**
16	0.05***	0.15***	0.31***	0.31***
17	0.84***	1.77**	0.28***	0.33***
18	0.04***	0.17***	0.01***	0.01***
19	0.06***	0.15***	0.38***	0.30***
20	0.06***	0.17***	0.02***	0.01***

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:
Customers & Product Developments (Select)**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	1.77**	1.19**	8.26*	3.04**
2	0.31***	0.35***	5.14*	0.61***
3	2.52**	0.17***	3.14**	9.64*
4	3.13**	1.28**	0.57***	3.61**
5	0.50***	0.85***	0.24***	0.05***
6	0.07***	0.11***	0.01***	0.01***
7	0.15***	0.28***	0.25***	0.34***
8	0.06***	0.48***	0.02***	0.10***
9	1.28**	0.09***	2.05**	2.02**
10	1.59**	0.17***	0.41***	1.45**
11	0.83***	0.71***	7.27*	1.45**
12	0.15***	0.07***	2.20**	1.38**
13	2.20**	1.98**	2.60**	2.61**
14	3.94**	0.96***	0.76***	5.14*
15	0.40***	0.35***	0.17***	0.07***
16	0.20***	0.09***	0.01***	0.03***
17	1.96**	0.23***	0.21***	0.06***
18	0.48***	0.37***	0.05***	0.04***
19	2.12**	0.99***	1.89**	6.81*
20	0.83***	0.61***	0.63***	3.20**

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:
Customer & Product Developments (All)**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	3.43**	2.56**	12.39	4.88**
2	0.70***	0.34***	7.97*	1.11**
3	4.75**	0.49***	5.41*	13.84
4	5.60*	2.74**	1.13**	5.73*
5	1.09**	1.90**	0.51***	0.12***
6	0.17***	0.30***	0.02***	0.02***
7	0.34***	0.71***	0.51***	0.65***
8	0.14***	0.42***	0.06***	0.20***
9	2.64**	0.29***	3.64**	3.44**
10	3.09**	0.49***	0.84***	2.53**
11	1.77**	1.66**	11.02	2.53**
12	0.37***	0.21***	3.74**	2.41**
13	4.19**	4.09**	4.55**	4.39**
14	6.92*	2.17**	1.50**	7.97*
15	0.89***	0.86***	0.37***	0.16***
16	0.47***	0.25***	0.03***	0.08***
17	3.61**	0.58***	0.44***	0.13***
18	1.00**	0.35***	0.12***	0.10***
19	4.05**	2.25**	3.37**	10.36
20	1.77**	1.50**	1.25**	5.31*

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:
Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	1.68**	2.74**	0.60***	0.43***
2	8.45*	12.84	4.20**	3.37**
3	1.91**	3.41**	1.02**	0.43***
4	9.46*	13.82	6.06*	4.09**
5	2.07**	3.47**	1.10**	0.66***
6	8.59*	14.99	5.81*	4.20**
7	1.34**	3.36**	6.44*	5.21*
8	8.17*	15.83	32.34	27.79
9	1.83**	3.52**	0.70***	5.57*
10	10.05	15.83	31.65	29.92
11	1.87**	3.41**	0.56***	0.43***
12	1.31**	2.69**	4.42**	4.64**
13	1.87**	3.09**	0.91***	0.60***
14	1.57**	3.04**	0.75***	0.53***
15	1.91**	3.41**	0.96***	0.72***
16	10.80	17.39	6.06*	5.69*
17	1.57**	3.09**	6.06*	6.44*
18	10.05	18.27	35.01	34.68
19	1.72**	3.14**	0.70***	0.54***
20	1.75**	3.41**	0.66***	0.56***

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:
Other Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	70.83	77.24	58.49	100.00
2	67.16	75.26	54.40	100.00
3	71.90	78.58	100.00	100.00
4	68.58	75.08	59.39	100.00
5	100.00	100.00	100.00	100.00
6	100.00	100.00	100.00	100.00
7	100.00	100.00	100.00	100.00
8	100.00	100.00	100.00	100.00
9	72.93	79.69	100.00	100.00
10	70.17	78.58	100.00	100.00
11	71.90	79.22	57.27	100.00
12	30.53	77.75	54.40	100.00
13	71.69	43.32	100.00	100.00
14	32.88	43.56	100.00	100.00
15	100.00	100.00	100.00	100.00
16	100.00	100.00	100.00	100.00
17	100.00	100.00	100.00	100.00
18	100.00	67.94	100.00	100.00
19	100.00	79.22	100.00	100.00
20	100.00	19.23	100.00	100.00

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:
New Office & Staff**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	22.32	55.90	53.58	42.25
2	64.76	76.14	79.80	72.28
3	71.89	80.49	87.07	78.35
4	90.25	93.74	83.82	100.00
5	58.86	68.44	80.22	73.47
6	79.96	88.40	100.00	100.00
7	51.48	67.86	39.09	69.51
8	79.44	89.43	70.64	100.00
9	73.55	82.68	56.77	80.88
10	91.54	95.52	82.89	100.00
11	24.03	59.98	51.93	45.43
12	39.25	55.90	79.52	77.44
13	71.61	80.49	86.32	81.15
14	69.55	80.28	85.33	79.80
15	57.12	69.05	79.20	38.68
16	83.51	90.76	100.00	71.39
17	54.18	66.70	38.25	37.37
18	82.86	91.70	73.82	72.81
19	71.89	82.11	55.59	81.41
20	72.17	83.79	54.79	82.41

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:
Acquisitions & Investments, Customer & Product Developments,
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.00***	0.00***	0.00***	0.00***
2	0.00***	0.00***	0.00***	0.00***
3	0.00***	0.00***	0.00***	0.00***
4	0.01***	0.00***	0.00***	0.00***
5	0.00***	0.00***	0.00***	0.00***
6	0.00***	0.00***	0.00***	0.00***
7	0.00***	0.00***	0.00***	0.00***
8	0.00***	0.00***	0.00***	0.00***
9	0.00***	0.00***	0.00***	0.00***
10	0.00***	0.00***	0.00***	0.00***
11	0.00***	0.00***	0.00***	0.00***
12	0.00***	0.00***	0.00***	0.00***
13	0.00***	0.00***	0.00***	0.00***
14	0.00***	0.00***	0.00***	0.00***
15	0.00***	0.00***	0.00***	0.00***
16	0.00***	0.00***	0.00***	0.00***
17	0.00***	0.00***	0.00***	0.00***
18	0.00***	0.00***	0.00***	0.00***
19	0.00***	0.00***	0.00***	0.00***
20	0.00***	0.00***	0.00***	0.00***

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Decreases and Announcements:
Acquisitions & Investments, Customer & Product Developments,
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	56.73	58.84	42.28	15.37
2	25.74	44.21	33.66	19.76
3	67.77	52.71	66.48	28.49
4	50.55	74.10	54.46	36.66
5	44.85	36.62	51.64	9.99*
6	30.48	47.50	24.83	23.91
7	71.18	73.54	56.77	61.68
8	70.09	90.93	39.48	78.41
9	32.37	90.39	58.83	79.61
10	67.14	93.67	73.01	88.64
11	39.81	65.32	38.68	17.50
12	21.18	32.73	11.97	23.36
13	42.06	49.34	59.03	29.15
14	33.86	73.23	49.36	40.84
15	34.23	20.88	42.01	56.11
16	43.36	47.58	13.93	25.46
17	75.90	74.16	94.10	67.75
18	95.63	85.96	76.31	73.56
19	24.54	78.79	79.33	50.61
20	67.77	92.82	89.17	66.49

Notes:

Tables report p-values of the hypothesis that significant XRP price decreases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements
Measured 3 Days Early:
Acquisitions & Investments, Customer & Product Developments,
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	70.51	77.44	54.48	38.30
2	39.21	61.43	45.26	34.43
3	86.47	94.30	72.75	58.53
4	58.52	70.66	61.80	68.60
5	58.31	58.31	40.38	26.78
6	58.31	58.31	40.38	19.92
7	58.31	63.38	46.77	26.78
8	58.31	38.09	46.77	26.78
9	78.98	90.13	76.59	58.53
10	60.66	82.41	70.57	53.77
11	68.52	82.19	63.92	55.79
12	58.03	63.06	45.26	42.78
13	82.61	93.72	82.21	77.60
14	74.25	92.02	59.42	58.53
15	58.59	43.49	40.62	33.89
16	58.59	63.66	40.62	33.89
17	58.59	68.25	53.04	33.89
18	58.59	72.38	47.03	40.62
19	86.47	85.26	83.72	75.09
20	83.98	84.97	72.75	66.26

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements
(90 Day Estimation Window):
Acquisitions & Investments, Customer & Product Developments,
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.00***	0.00***	0.00***	0.00***
2	0.00***	0.00***	0.00***	0.00***
3	0.00***	0.00***	0.00***	0.00***
4	0.00***	0.00***	0.00***	0.00***
5	0.00***	0.01***	0.00***	0.00***
6	0.00***	0.00***	0.00***	0.00***
7	0.00***	0.00***	0.00***	0.03***
8	0.00***	0.00***	0.00***	0.00***
9	0.00***	0.00***	0.00***	0.01***
10	0.00***	0.00***	0.00***	0.01***
11	0.00***	0.00***	0.00***	0.00***
12	0.00***	0.00***	0.00***	0.00***
13	0.00***	0.00***	0.00***	0.00***
14	0.00***	0.00***	0.00***	0.00***
15	0.01***	0.01***	0.01***	0.01***
16	0.01***	0.02***	0.00***	0.00***
17	0.00***	0.00***	0.00***	0.00***
18	0.00***	0.00***	0.01***	0.00***
19	0.00***	0.00***	0.00***	0.00***
20	0.00***	0.00***	0.00***	0.00***

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements
(360 Day Estimation Window):
Acquisitions & Investments, Customer & Product Developments,
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.00***	0.00***	0.00***	0.00***
2	0.00***	0.00***	0.01***	0.01***
3	0.00***	0.00***	0.00***	0.00***
4	0.00***	0.00***	0.00***	0.01***
5	0.00***	0.00***	0.00***	0.00***
6	0.00***	0.00***	0.00***	0.02***
7	0.00***	0.00***	0.00***	0.01***
8	0.01***	0.00***	0.00***	0.02***
9	0.00***	0.00***	0.00***	0.00***
10	0.00***	0.00***	0.00***	0.00***
11	0.00***	0.00***	0.00***	0.00***
12	0.00***	0.00***	0.00***	0.00***
13	0.00***	0.00***	0.00***	0.00***
14	0.00***	0.00***	0.00***	0.00***
15	0.00***	0.00***	0.00***	0.00***
16	0.00***	0.00***	0.00***	0.00***
17	0.00***	0.00***	0.01***	0.00***
18	0.00***	0.00***	0.00***	0.00***
19	0.00***	0.00***	0.00***	0.00***
20	0.00***	0.00***	0.00***	0.00***

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements
(1 Day Event Window):
Acquisitions & Investments, Customer & Product Developments,
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.00***	0.00***	0.00***	0.02***
2	0.00***	0.00***	0.01***	0.01***
3	0.00***	0.00***	0.00***	0.00***
4	0.00***	0.01***	0.00***	0.00***
5	0.00***	0.01***	0.00***	0.00***
6	0.00***	0.01***	0.00***	0.00***
7	0.00***	0.01***	0.01***	0.01***
8	0.00***	0.01***	0.00***	0.00***
9	0.01***	0.00***	0.00***	0.01***
10	0.01***	0.02***	0.01***	0.03***
11	0.00***	0.00***	0.00***	0.01***
12	0.00***	0.00***	0.01***	0.00***
13	0.00***	0.00***	0.00***	0.00***
14	0.00***	0.00***	0.00***	0.00***
15	0.00***	0.00***	0.00***	0.00***
16	0.00***	0.00***	0.00***	0.00***
17	0.00***	0.01***	0.01***	0.00***
18	0.00***	0.00***	0.00***	0.00***
19	0.00***	0.00***	0.00***	0.00***
20	0.00***	0.00***	0.00***	0.01***

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements
(7 Day Event Window):
Acquisitions & Investments, Customer & Product Developments,
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.04***	0.01***	0.10***	0.18***
2	0.01***	0.00***	0.13***	0.01***
3	0.00***	0.00***	0.00***	0.03***
4	0.04***	0.00***	0.01***	0.01***
5	0.00***	0.01***	0.00***	0.00***
6	0.00***	0.01***	0.00***	0.00***
7	0.00***	0.00***	0.00***	0.00***
8	0.00***	0.02***	0.00***	0.01***
9	0.02***	0.00***	0.01***	0.05***
10	0.09***	0.01***	0.04***	0.05***
11	0.01***	0.01***	0.08***	0.04***
12	0.00***	0.00***	0.00***	0.00***
13	0.00***	0.00***	0.00***	0.01***
14	0.00***	0.00***	0.00***	0.00***
15	0.01***	0.02***	0.00***	0.00***
16	0.00***	0.00***	0.00***	0.00***
17	0.00***	0.00***	0.00***	0.00***
18	0.00***	0.01***	0.00***	0.00***
19	0.02***	0.03***	0.02***	0.00***
20	0.01***	0.00***	0.00***	0.00***

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and
Random Exclusion of Events From:
Acquisitions & Investments, Customer & Product Developments,
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.00***	0.00***	0.00***	0.01***
2	0.00***	0.00***	0.01***	0.00***
3	0.00***	0.00***	0.00***	0.00***
4	0.01***	0.00***	0.00***	0.00***
5	0.00***	0.00***	0.00***	0.00***
6	0.00***	0.00***	0.00***	0.00***
7	0.00***	0.00***	0.00***	0.00***
8	0.00***	0.01***	0.00***	0.00***
9	0.00***	0.00***	0.00***	0.00***
10	0.00***	0.00***	0.00***	0.01***
11	0.00***	0.00***	0.00***	0.00***
12	0.00***	0.00***	0.00***	0.00***
13	0.00***	0.00***	0.00***	0.00***
14	0.00***	0.00***	0.00***	0.00***
15	0.00***	0.00***	0.00***	0.00***
16	0.00***	0.00***	0.00***	0.00***
17	0.00***	0.00***	0.00***	0.00***
18	0.00***	0.00***	0.00***	0.00***
19	0.00***	0.00***	0.00***	0.00***
20	0.00***	0.00***	0.00***	0.00***

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and
Random Inclusion of Events To:
Acquisitions & Investments, Customer & Product Developments,
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.00***	0.00***	0.02***	0.04***
2	0.00***	0.00***	0.04***	0.01***
3	0.00***	0.00***	0.00***	0.01***
4	0.03***	0.01***	0.00***	0.01***
5	0.00***	0.00***	0.00***	0.00***
6	0.00***	0.00***	0.00***	0.00***
7	0.00***	0.00***	0.00***	0.00***
8	0.00***	0.02***	0.00***	0.00***
9	0.01***	0.00***	0.00***	0.01***
10	0.03***	0.01***	0.01***	0.02***
11	0.00***	0.00***	0.01***	0.01***
12	0.00***	0.00***	0.01***	0.00***
13	0.00***	0.00***	0.00***	0.00***
14	0.00***	0.00***	0.00***	0.00***
15	0.00***	0.00***	0.00***	0.00***
16	0.00***	0.00***	0.00***	0.00***
17	0.00***	0.00***	0.00***	0.00***
18	0.00***	0.02***	0.00***	0.00***
19	0.00***	0.00***	0.00***	0.00***
20	0.00***	0.00***	0.00***	0.00***

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:
Acquisitions & Investments**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	100.00	15.66	100.00	100.00
2	11.70	3.17**	32.32	27.80
3	50.44	20.22	41.18	26.45
4	50.44	3.91**	40.62	31.05
5	52.31	58.78	100.00	34.79
6	48.00	59.58	100.00	33.57
7	100.00	59.18	100.00	100.00
8	100.00	60.76	100.00	100.00
9	54.12	61.90	100.00	35.40
10	52.77	61.14	100.00	36.00
11	100.00	19.56	100.00	100.00
12	12.28	4.14**	32.32	32.32
13	48.99	18.57	100.00	32.95
14	13.79	5.00**	41.73	34.79
15	47.50	59.18	100.00	36.00
16	49.48	61.90	38.92	36.59
17	52.31	59.98	100.00	100.00
18	52.31	63.02	100.00	100.00
19	51.38	57.55	100.00	33.57
20	51.85	5.52*	40.62	36.59

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

**Significance of Generalized Rank Test
Applied to Milestones, Trading Platform
Listings, Customer & Product
Announcements, Acquisitions & Investments,
and Ripple Commercialization Initiatives**

Model Number	Minimum T-Statistic	Maximum T-Statistic
1	3.06***	3.25***
2	2.48**	2.82***
3	4.04***	4.24***
4	3.47***	3.89***
5	3.74***	3.99***
6	3.17***	3.28***
7	3.28***	3.81***
8	2.75***	3.48***
9	3.83***	4.35***
10	3.33***	4.12***
11	3.08***	3.30***
12	2.41**	2.76***
13	4.15***	4.43***
14	3.45***	3.85***
15	3.80***	3.90***
16	3.01***	3.43***
17	3.33***	3.97***
18	2.87***	4.03***
19	3.74***	4.44***
20	3.01***	4.02***

Notes:

* Indicates significance at the 10% level

** Indicates significance at the 5% level

*** Indicates significance at the 1% level

APPENDIX F

INFORMATIONAL EFFICIENCY OF XRP PRICES

1. In this Appendix I provide additional discussion on the informational efficiency of XRP prices during the period from February 1, 2014 to December 31, 2020. In the literature of economics and finance, in an informationally efficient market, prices “fully incorporate the expectations and information of all market participants.”¹ There are three forms of efficiency:²
 - a. Weak Form Efficiency: Prices reflect past prices;
 - b. Semi-Strong Form Efficiency: Prices reflect all public information; and
 - c. Strong Form Efficiency: Prices reflect all private information.
2. This taxonomy represents an order. Since “all private information” includes “all public information” which includes “past prices,” if a market is not weak-form efficient, then it cannot be semi-strong and hence cannot be strong.
3. A key implication of weak form efficiency is that returns must be unpredictable based on past returns alone, meaning that intertemporal correlation of an asset’s returns—called “autocorrelation”—must be zero.³ Finding a counter example, that is, establishing that an asset’s return at t is correlated with its returns at $t - s$, effectively establishes that the market for that asset is not weak form efficient, which establishes that it is not semi-strong or strong.
4. As discussed in my report, academic researchers have found that the digital token markets, including the XRP market, are generally less informationally efficient than the stock market, though there is evidence that efficiency is increasing over time.⁴

¹ See, e.g., John Y. Campbell, Andrew W. Lo, and A. Craig MacKinlay, “*The Econometrics of Financial Markets*,” 2nd Edition, p. 20 (“In an informationally efficient market...price changes must be unforecastable if they are properly anticipated, i.e., if they fully incorporate the expectations and information of all market participants.”).

² See, e.g., John Y. Campbell, Andrew W. Lo, and A. Craig MacKinlay, “*The Econometrics of Financial Markets*,” 2nd Edition, p. 22 (“The classic taxonomy of information sets, due to Roberts (1967), distinguishes among Weak-form Efficiency: The information set includes only the history of prices or returns themselves. Semistrong-Form Efficiency: The information set includes all information known to all market participants (*publicly available* information). Strong-Form Efficiency: The information set includes all information known to any market participant (*private* information).”).

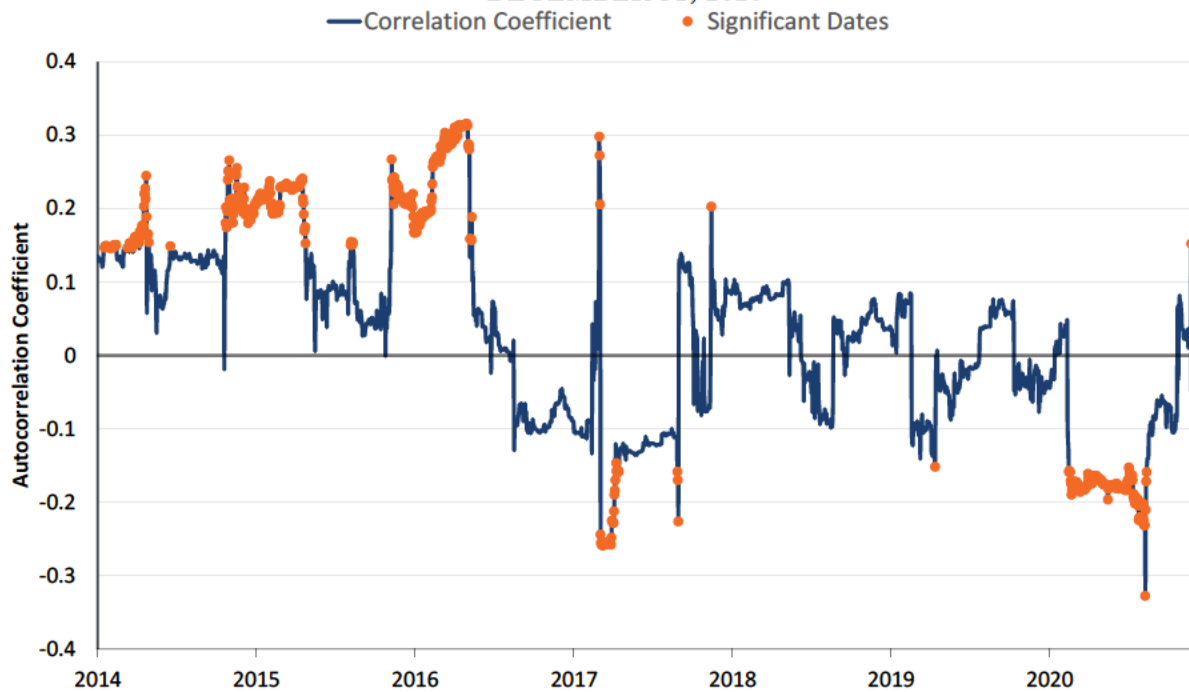
³ See, e.g., Zvi Bodie, Alex Kane, and Alan J. Marcus, “*Investments*,” 9th Edition, 2010, p. 358 (“Weak-Form Tests: Patterns in Stock Returns ... Early tests of efficient markets were tests of the weak form. Could speculators find trends in past prices that would enable them to earn abnormal profits? ... One way of discerning trends in stock prices is by measuring the *serial correlation* of stock market returns. Serial correlation refers to the tendency for stock returns to be related to past returns. Positive serial correlation means that positive returns tend to follow positive returns (a momentum type of property). Negative serial correlation means that positive returns tend to be followed by negative returns (a reversal or ‘correction’ property).”).

⁴ See, e.g., Andrew Urquhart, “The Inefficiency of Bitcoin,” *Economics Letters* Vol. 148, 2016, p. 5 (“...we do show that Bitcoin may be becoming more efficient with some of the tests for market efficiency suggesting that Bitcoin returns are random in the second subsample. ... Since it is a relatively new investment asset and still in its infancy, it is similar to an emerging market and therefore the inefficiency finding is not surprising.”).

APPENDIX F

5. I examined the autocorrelation of XRP returns and my findings are consistent with this literature. Figure 1 below plots the autocorrelation of XRP returns from February 1, 2014 to December 31, 2020. Specifically, I examine the correlation between XRP's daily returns and its previous day's returns over a 180-day rolling window, a measure of "first-order autocorrelation."
6. Figure 1 shows that XRP returns exhibit both positive and negative autocorrelation between February 1, 2014 and December 31, 2020 (the blue line). Days where the autocorrelation is statistically significantly different from 0 are identified by orange dots. For both positive and negative autocorrelation, there are periods where such autocorrelation is statistically significant. During these periods, I can reject the hypothesis that XRP prices are even weak form efficient.

Consistent with this argument is that Bitcoin will become more efficient over time as more investors analyse and trade Bitcoin."); Aurelio F. Bariviera, "The Inefficiency of Bitcoin Revisited: A Dynamic Approach," *Economics Letters* Vol. 161, 2017, Abstract ("...daily returns exhibit persistent behavior in the first half of the period under study, whereas its behavior is more informational efficient since 2014."); Aviral Kumar Tiwari, R.K. Jana, Debojyoti Das, and David Roubaud, "Informational Efficiency of Bitcoin—An Extension," *Economics Letters* Vol. 163, 2018, Abstract ("We report that the market is informational efficient as consistent to recent findings of Urquhart (2016), Nadarajah and Chu (2017) and Bariviera (2017).") and pp. 6-7 ("We observe that the market is largely efficient with some exception to the period of April-August, 2013 and August-November, 2016."); and Ahmet Sensoy, "The Inefficiency of Bitcoin Revisited: A High-Frequency Analysis with Alternative Currencies," *Finance Research Letters* Vol. 28, 2019, Abstract ("We find that BTCUSD and BTCEUR markets have become more informationally efficient at the intraday level since the beginning of 2016, and BTCUSD market is slightly more efficient than BTCEUR market in the sample period.").

APPENDIX F**FIGURE 1: AUTOCORRELATION OF XRP RETURNS BETWEEN FEBURARY 1, 2014 AND DECEMBER 31, 2020**

7. Not finding significant first-order autocorrelation, as holds during some periods, is not sufficient to establish that this market is semi-strong or strong form efficient. However, I note that my statistical conclusions hold even at a one-day test window, as shown in Appendix E. Even if one were to believe that this market is informationally efficient in the semi-strong sense and hence believe that prices should fully reflect all public information “quickly,” the hypothesis that the XRP market is independent of news of actions of Ripple Labs can be rejected at any reasonable significance level.